THE SOLDIER'S POCKET-BOOK

FOR FIELD SERVICE

MAJOR-GENERAL SIR G. WOLSELEY

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FOR FIELD SERVICE

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BY

MAJOR-GENERAL SIR GARNET J. WOLSELEY
G.C.M.G., K.C.B.
INSPECTOR-GENERAL OF AUXILIARY FORCES

THIRD EDITION, REVISED AND ENLARGED

WITH ILLUSTRATIONS

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PREFACE TO THIRD EDITION.

This edition has been revised throughout, and much new matter added to it. Bearing in mind the practical object of the work, whilst not overloading it with regulations or military science, I have endeavoured to make it worthy of those for whose benefit it is intended.

When I entered the service, our officers were very ignorant of their profession. Recent wars, and above all, the Volunteer movement in England, have turned public attention to military subjects; and it must be assuring to the nation to know that there is now an earnest desire on the part of our rising officers to learn their work scientifically and thoroughly. All now feel that success in war can only be achieved with an army led by highly instructed officers; and when next Her Majesty may find it necessary to vindicate the honour of our country by an appeal to arms, She may depend upon Her officers being as distinguished for military knowledge as they always have been for daring courage.

I am vain enough to think that this little book will be useful to all ranks of all branches and departments of Her Majesty's Military Forces.

G. J. W.

London: *December*, 1874.

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C. J. W.

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PREFACE TO FIRST EDITION.

During many campaigns, and particularly at the outset of my career as a soldier, I felt the great want of a practical and portable book upon the ordinary duties that fall to the lot of soldiers when in presence of an enemy. Much useful information can be obtained from the Queen's Regulations, and from the Field Exercise Book; but as the instructions published by authority for the use of our army are almost exclusively intended for peace service, they are likely to lead one into difficulties if adhered to in the field. Some few years ago, when Sir R. Airey was Q.M.G. of the army, he proposed to have a practical handbook for the staff, compiled by experienced officers of his department, and published for the use of the army. A little money was required for the purpose, which the War Office, from economical motives, would not allow. I was to have been one of those employed to write; so when the scheme failed, I resolved to bring out a work of that description on my own responsibility. The following pages are the result of that determination, and of my leisure hours for the last four years. No claim is made for them on the score of literary merit. Almost everything in them is deduced from my own personal experiences; whereas it is a curious circumstance, that nearly all the English books upon war, including the only one intended as an *aide mémoire* for field service, are from the pens of men who have never seen a shot fired in anger. Some of these books teach the theory of war admirably. It is most essential that every officer should have a good knowledge of his science, based upon the history of former wars; but to know how to apply that knowledge to any good purpose in the field cannot be acquired from such works. This Pocket-Book is intended to be a guide to officers

from the moment war is declared: it enters into the most minute details on everything connected with the wild life one has to lead in the field, when cut adrift, perhaps, entirely from civilisation, but, at any rate, from cooks, clubs, tailors, and bootmakers. I make no apologies for its shortcomings, but publish it in the hope that it may be found useful by soldiers of all ranks in Her Majesty's army.

G. J. W.

MONTREAL: *March*, 1869.

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LIST OF ABBREVIATIONS.

A.G. —Adjutant General.
A.D.C. —Aide de Camp.
A.A.G. —Assistant Adjutant General.
A.Q.M.G. — Do. Quarter-Master-General.
A.S.C. —Army Service Corps.
A.H.C. —Army Hospital Corps.
B.L.R. —Breech Loading Rifle.
B.M. —Brigade Major.
C.O. —Commanding Officer.
C. of the S.—Chief of the Staff.
C.-in-C. —Commander-in-Chief.
C.R.E. —Commanding Royal Engineers.
C.R.A. —Commanding Royal Artillery.
F.O. —Field Officer.
G.O. —General Order.
G.O.C. —General Officer Commanding.
G.S. Waggon.—General Service Waggon.
H.A. —Horse Artillery.
M.L. —Muzzle Loader.
M.O. —Medical Officer.
N.C.O. —Non-Commissioned Officer.
P.M. —Provost-Marshal.
P.M.O. —Principal Medical Officer.
O.C. —Officer Commanding.
Q.M. —Quarter-Master.
Q.M.G. — „ „ General.
R.A. —Royal Artillery.
R.E. —Royal Engineers.
S.B. —Smooth Bore.
S.A.A. —Small Arm Ammunition.
S.O. —Staff Officer.
S.S. for War.—Secretary of State for War
S. Sergt.—Staff Sergeant.
W.O. —War Office.

′ over a figure indicates feet; ″ indicates inches.

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THE

SOLDIERS' POCKET BOOK.

PART I.

Advice to Officers on Service, as regards their bearing towards their Men.—The relation existing between the rank and file and officers of our army, although peculiar, is not a subject upon which much reflection is common. To officers brought up in regiments, accustomed to see the ordinary routine of military life go on as a machine, it seldoms occurs that any change could be made for the better. In fact, many pass their lives without discovering that the military career has any higher aim than that of moving men on parade by a most complicated process called drill, and that of keeping order amongst them at all times by a rigid system of espionage, which is believed to be discipline. There is but little real sympathy between them and their men. Forgetting that the feudal system has passed away, as long as they do their duty by their soldiers, they expect to find them always ready to obey their nod, and to stand by them in all moments of peril. Pages might easily be filled in narrating the gallant deeds of our officers, and in recounting instances of their reckless personal exposure to save the lives of those under their command. Creditable as such conduct is, more still is expected of them. They must make themselves loved as well as respected. In our intercourse with the rank and file, we must make them realise that all our interests are identical, causing the latest-joined recruit to feel that success is of as much real moment to him as it can be to the general. Let us sink as far as possible the respective titles of officers, sergeants, and privates, merging them into the one great professional cognomen of soldier, causing all ranks to feel that it is a noble title of which the general as well as the private may well be proud. Let us give up the phrase 'officer and gentlemen,' substituting that of 'soldier' for it; let the word officer be used as seldom as possible, so that the private may really feel that there is no gulf between him and his commander, but that they are merely separated by a ladder, the rungs of which all can equally aspire to mount.

The only rewards that are justly our due are the gratitude of our country and the praise of our superiors. Company officers should remember that it

is always in their power to bestow the latter, and they should never lose an opportunity of calling attention publicly to the gallantry of their men, distinguishing individuals and holding them up to the admiration of others. In an army praise is the greatest of all moral levers, if administered with discrimination: it is a trump card, costing nothing, that is always at the disposal of the officer, be he commander or captain, which enables him to win if he knows how to use it. The bestowal of praise creates an intimacy between the giver and receiver which it is most desirable to establish between all ranks. Study to be familiar without being vulgar, and habit, if not intuition, will soon enable you to be gracious and intimate with your men without any loss of dignity. In all regiments some officers are immense favourites with their men, and others the reverse. This is especially the case on active service, where community of danger, and constant association create comradeship unknown in peace. Many privates only know their officers as men who award them punishment, and although they know they are always treated with justice, such a condition of affairs must ever be prejudicial to the interests of our service; you must be intimate with your men before they will love you, and they must love you before you can hope to get the most out of them. You should study their prejudices, learn their individual characters, and by a knowledge of their respective sensitiveness, guard against wounding their feelings, for in every company there will be men of actual refinement in comparison to others. Strive to raise the majority to a level with that small minority.

The officer should take a lively interest in their amusements, encouraging them in the practice of all manly sports. In fine he should sympathise with their likes and dislikes, their pleasures and annoyances, being ready at all times to listen attentively to their grievances, be they supposed or real, until at last they regard him as one of themselves, a companion and a friend. For and with such a man they will brave any danger or endure any amount of privation. Upon all occasions appeal to their honour and chivalrous feelings: show them that you have confidence in them and trust them. Cease to treat them as unreasoning children unable to take care of themselves. You will thus develop and create in their breasts feelings of honour even if they had previously been devoid of them. In your punishments make the most marked distinction between ordinary offences and those committed when on duty, treating the latter with great severity. In fact, spare no pains to create and foster the growth of military spirit, by impressing upon all ranks the importance of their duties. Whatever may be the reason of it, it is nevertheless a fact that up to the present time we have never had an English commander who succeeded in calling forth any great enthusiasm for himself or the cause in hand. We are too prone to fall down before the great Duke, and think that everything he did was right, and that his method with soldiers was the best. Without wishing

We are quite wrong about the Duke

for a moment to depreciate either the General or his services, let any one read the history of his wars, and what he accomplished, and then picture to himself what the Duke might have done if his soldiers had had for him the feelings that the French had for their Emperor. Napoleon was above all a student of character and of the passions and feelings that influence men's conduct. By means of spirit-stirring proclamations, by appeals to their love of glory and all those points upon which he knew Frenchmen to be susceptible, he was able to extract from his soldiers everything that they were capable of. It is not true that Englishmen are utterly devoid of such high sentiments, but it is only special nourishment and treatment that will develop feelings so long ignored. Let any General arise who knows how to do so, and a new era of victory will be arrived at in British history. Let officers of all ranks ponder on this subject, and in their own sphere, no matter how humble that may be, let them endeavour to call out the finer and better qualities of those serving under them. No man can respond with greater alacrity than the British soldier will, when an officer who understands him makes an appeal to his honour, his love of country, his loyalty, and to all those subtle but powerful influences which alone can convert mobs into armies. 'The greatest talent of a General,' says Plutarch, 'is to secure obedience through the affection he inspires.' In fact, if you want to win battles, make yourself loved by those who serve under you.

MILITARY SPIRIT AND DISCIPLINE.—There has been a tendency of late to make all regiments alike in their outward appearance, and to consider them so in their feelings. Machines into which the individual talents and disposition of men enter so largely, as into those called regiments, are never calculated to keep time alike as watches do. The idiosyncrasies of commanding officers, historical traditions, and established customs, affect the character of regiments more than might be imagined by those who draw their idea of our service from 'H. M. Regulations.' The endeavour to assimilate them has not been happy; like democracy, it has had a tendency to pull down the best to a level with the worst, instead of raising the latter. *Esprit de corps* is made up of trifles; a rose by any other name smells differently to military nostrils. The guardsman reduced to a linesman is not the fine guardsman any longer. Take the best Rifle battalion and clothe it in red, it would soon cease to be the dashing body of skirmishers it is now. No man who knew soldiers or their peculiar way of thinking, or who was acquainted with the many little trifles that go to make up *esprit de corps*, and that form as it were a *lien* between it and discipline, would ever deprive a soldier of any peculiarity that he prided himself on, without having some overpowering reasons for doing so.*

* *Since writing the above, I have read a passage in Kinglake's 'Crimea,' which embodies my idea in such good language, that I beg to refer to it. See page No.* 150 *of Vol. III. beginning at, 'In the capital of many a State,' &c.*

The soldier is a peculiar animal that can alone be brought to the highest efficiency by inducing him to believe that he belongs to a regiment which is infinitely superior to the others around him. In their endeavours to foster this spirit, colonels are greatly aided by being able to point to some peculiarity in dress or title. The spirit of general assimilation has been borrowed from France; but in carrying it out we have gone into extremes, as we always do. An attempt to change the dress of the Madras army led to the mutiny of Vellore. The Duke of Wellington said of his officers in Spain, that many of his best men were the greatest dandies. The better you dress a soldier, the more highly he will be thought of by women, and consequently by himself. Dress is of much more consequence than civil ministers imagine. Before the Crimean war our dress regulations had been carried out so strictly to the letter of the law, that there was a rebound as soon as men got free from the surveillance of town-majors. This feeling was fostered, amongst the younger officers especially, by the spirit of the public press, which went towards inculcating the idea that everything old was bad. Many men before Sebastopol seemed to pride themselves upon looking as little like soldiers as possible. To be unshaven, and to be dirty, was supposed by some to be the sure sign of a good officer. This spirit runs like wildfire amongst an army. Whatever the officers think fine, the men will think so too. It is very difficult to make an Englishman at any time look like a soldier. He is fond of longish hair and uncut whiskers. Men who have never worn beards are apt to think that to wear one saves a great deal of trouble. It does so, if you do not clean it; but to wear a long one, and keep it clean, demands more time and trouble than shaving. On service discipline deteriorates when but little attention is paid to dress, and when the men wear almost what they like. It is an incalculable drawback to an officer who is ordered on active service in command of a regiment, never to have had experience of real war and actual campaigning; he is at a loss how to act; to keep up the strict discipline of the home garrison-town in all its minutiæ, would be as impossible as it would be mad to attempt it. To know where to relax, where to remain firm, and where to tighten the reins, requires the exercise of great common sense, aided by experience in the customs of war. Allowance under all circumstances must be made for men who march daily. They cannot be expected to be shaved and have their clothes as well brushed as if in barracks: but without wearying, or in any way bullying them, a great deal may be done by officers acting upon a good system.

The greater the individuality you give to the soldier himself and to his battalion, the more he feels that his individual conduct is of importance. No pains should be spared by officers in impressing upon their men the consequence that attaches itself to the behaviour of each of them. Make a man proud of himself and of his corps, and he can always be depended

upon. He must believe that his duties are the noblest that fall to man's lot. He must be taught to despise all those of civil life. Soldiers, like missionaries, must be fanatics. An army thoroughly imbued with fanaticism can be killed, but never suffer disgrace ; Napoleon, in speaking of it, said, 'Il en faut pour se faire tuer.'

It is difficult to devise punishments for all crimes not to be punished by death. This is particularly the case on the march. All the dirty fatigue-duties about a camp should be performed by defaulters. Care is required that punishments awarded may not in any way whatever affect the men's health or reduce their strength. When a force is marching daily, all extra drills must be avoided, lest the men to be punished should be overworked by them.

Soldiers, particularly old soldiers, are naturally grumblers. The self-abnegation which is necessary on service finds a safety-valve in a 'good growl.' The best and most faithful servants are often the greatest grumblers. This disposition cannot be treated too cautiously and with too light a hand. The tendency should be checked in young officers, for if they grumble, the privates will follow in a chorus that will soon grow too loud.

The only European war of which this generation of our soldiers know anything, is that against Russia. It taught us many useful lessons, not the least of which was the necessity that exists for watching over the morale of our men. We are apt to think that if the Briton is well fed, well looked after, and well led by his officers, everything he is capable of has been given a fair field, and that all will in consequence be brought out.

During the siege of Sebastopol, I verily believe that a large proportion of our men did not know the name of the General commanding. They seldom saw him ; he did not live amongst them. If he had feelings in common with them, they did not know it. No touching appeals were made to their feelings of honour and patriotism. All our attention was bestowed on their stomach ; and the result was we never got much out of our men, and that in August 1855, our army was in a discreditable condition of demoralisation.

VOLUNTEERING FOR DANGEROUS SERVICES.—It is common for men to say that volunteers in war 'come to no good,' that the system of calling for them when there is any particularly dangerous service to be performed is pernicious, that men should content themselves with doing what they are ordered, &c. Such expressions were invented, and are still repeated, by men who do not like danger—men whom no glorious impulse could ever induce to volunteer for anything—men who have no courage for deeds that bring fame and honour with them, and who are consequently jealous

of men who have. They are therefore anxious to prevent others availing themselves of opportunities that occur for acquiring distinction. Let no soldier be deceived by such twaddle. If you are ambitious and 'covet honour,' never lose a chance of leading or taking part in storming parties and all enterprises that put you in contact with the enemy. If this reasoning of timid men once gets hold of an army, it is enough of itself to stifle all enthusiasm and noble daring, without which no one can be a good soldier, and without which an army of the most talented men in the world is useless; it is a dead body, incapable perhaps of cowardice, but powerless for great deeds. Love of country, disregard of personal comfort, and the constant exposure of one's life for the safety of others and the honour of one's Sovereign, are sentiments and actions without which no army can long exist. We have been too much educated to believe that the British soldier is simply a machine, incapable of noble impulses. Let us eradicate such an impression, and foster the wish for distinction, by calling for volunteers to perform all services of unusual danger, or those that require more than ordinary courage. The officer, be he general or captain, who acts upon the principle that all his soldiers are equally brave, will some day find out his error to his cost. The longing for distinction, which is, one may say, the mainspring to all military feeling, enters largely into this subject. If volunteers are called for, and succeed in their undertaking, they must be petted and rewarded. It is to be hoped that in our next war the General commanding may have the power to confer the ribbon of the Victoria Cross on the spot, subject to Her Majesty's approval afterwards. It is a great stifler to military enthusiasm that a man who has distinguished himself must wait a long tedious reference to England before he can obtain any formal recognition of his service. One man who volunteers for any special service of danger, is worth two men taken at hazard from the ranks.

In action, to be cool and to seem ignorant that any danger exists, is of the first consequence; you must at the same time, however, evince a lively interest in all that is going on: come what may, have a smiling face. If your men are under a fire to which they are not replying, walk about in front of them as they are lying down. I do not mean that you are never to avail yourself of cover, for when skirmishing it is your duty to do so, but under the above-mentioned circumstances the best troops are prone to become unsteady, and it is then the especial duty of officers to set an example of coolness and steadiness. When wounded, officers should take a pride in refusing the assistance of their men to take them to the rear; men are only too fond of helping their wounded comrades out of fire, and when once away, it is difficult to get them back again. All must learn to wait for the ambulance. It should be impressed upon them by their officers, that the wounded of a victorious army are always taken care of, whilst

those of the beaten side fare badly. It is more essential, therefore, for the wounded than for others, that their army should win, and the fewer men withdrawn from the front line to take charge of wounded the greater is their chance of success.

Advice to Officers ordered on Service.—The army having been distributed into its several divisions, &c., the general officers to command them, and the staff having been carefully selected, it behoves all officers ordered to take part in the operations, to decide upon their field kit, and make arrangements for living beyond the reach of shops and tradesmen. If they have not been vaccinated, they should be so at once.

In the Article on Field Kit will be found the result of the author's personal experience in several campaigns. Previous to embarkation the best maps of the intended theatre of war should be procured and studied at every spare moment. All good works throwing light upon its history, resources, geography, the manners and customs of the people, its climate, its military and naval strength, &c., are to be carefully studied, and a précis made of all such information, particularly as regards the military events that have taken place in it; the positions taken up by opposing parties, and those where battles were fought, sieges carried on, to be noted down in the pocket-book, so that such places may be examined whenever the subsequent movements of the army enable it to be done. The nature and description of rivers, where navigable and where fordable, the bridges over them, the chains of mountains, with the passes through them, the railroads, routes, and other communications. The natural productions, the nature of the timber, &c., &c., to be studied.

The same pocket-book to have noted in it the dates when the respective seasons begin and end. The composition and distribution of the enemy's forces; a page in the pocket-book should be devoted to each corps, giving all details as to divisions, batteries, brigades, regiments, battalions, and the names of commanding officers as far as possible; this will be of incalculable service when prisoners are taken, as the fact of a certain corps being there would indicate that such and such a division was in your immediate front. The description of guns should be given, and it must be noted whether the numbers given include officers and non-commissioned officers, and non-combatants, or only the rank and file of bayonets and sabres. It is almost needless to add that at least a colloquial knowledge of the language is of incalculable value. All staff-officers are expected to speak French. If the war is to be carried on in a country whose language is unknown to the officer, he can at least do much towards acquiring a partial knowledge of it; he can learn from a vocabulary the names of things, and a few easy sentences.

There is no way by which a man of very inferior ability can obtain a

reputation amongst us for cleverness and learning so easily as by the study of languages. The same amount of application bestowed upon them, as is frequently given without any result to other subjects, will often secure good posts for men who are wise enough to make languages their study. This fact comes home to all who have served much in India. Where the language of a country in which war is being carried on is not generally known in an army, the services of those men who can speak it are of such value that they cannot be neglected.

FIELD EQUIPMENT FOR OFFICERS.—It should be of the least possible weight, and contain the fewest articles compatible with the maintenance of health. Comfort must be disregarded when men take the field, as it is only a personal matter; but it is essential for the good of the State that they keep themselves in such good health that they are ready at all times to do the hardest work. Englishmen are so fond of their tub, and so particular as to the cleanliness of their persons, that many think it impossible to forego such luxuries; but it is surprising how soon one can learn to do without them. We are too prone to overload ourselves with baggage in the field; it is a saying abroad that 'chaque officier anglais a sa basinoire.' This 'chaff' comes home to us with only too much truth. Formerly, men went campaigning prepared to lead a gipsy life, independent of all supplies in the way of clothes; wars lasted for years then, and the means of obtaining shirts, boots, &c., from home were small. Now, a few weeks is the utmost one can be separated from railway communication, and a few months will probably be about the duration of active operations carried on by regular armies. Supplies of socks, boots, trousers, shirts, soap, towels, &c., should be pushed well to the front in bulk, to be issued as required. The infantry must be content with less than mounted officers, who can carry extra things on their second chargers.

A Committee lately assembled at the War Office has decided that, in future, the baggage of all officers in the field should be restricted to 80 lbs. for each field officer; 50 lbs. for other mounted officers having only one charger; and 40 lbs. for all dismounted officers, as proposed in the first edition of this pocket-book. The valise therein described as intended to form the bed and contain the kit will most probably be adopted, if not exactly as proposed, at any rate in its general form.*

The Cooking for officers will in future be done by Companies and Troops, cooking utensils not to exceed 22 lbs. in weight, will be carried for the officers of each Troop and Company.†

* *This valise is to be seen at the pattern-room, Horse Guards; and at Messrs. Abbo't and Anderson, Dodd Street, Burdett Road, Lime Street: and at Messrs. Townley and Co.,* 18, *George Street, Hanover Square: the price is about* 23 *shillings.*

† *A pattern set of cooking utensils weighing about* 24 *lbs. can be had from Mr. T. White, Military Outfitter, Aldershot.*

In addition to this valise, which is to be looked upon as the light equipment of officers, there will be allowed to every officer a bullock-trunk to carry about 100 lbs. weight of personal baggage. This trunk may be embarked with the officers, but must be left at the base of operations during active movements in the field, to be brought up only when it may be deemed convenient to the service by the General Officer in chief command.*

An Infantry officer's kit will be as follows :—

Worn or carried on the Person.—Shako, tunic, trousers, shooting-boots, socks (woollen), drawers, flannel shirt, silk pocket-handkerchief, gaiters, clasp-knife (with a tweezers in it), drinking-cup and water-bottle,† pocket-book,‡ telescope (having compass attached to it), watch, waterproof-coat, haversack, and a map of the country.

To be carried in Valise, forming Bed.—A great-coat with cape—new pattern (8 lbs.), 1 blanket (4½ lbs.), 1 pr. of trousers (2 lbs. 2 oz.), 1 pr. of shooting-boots and 6 spare boot-laces (2 lbs. 14 oz.), 2 pr. of worsted socks (8 oz.), 1 pr. of drawers (10 oz.), 1 flannel shirt (13 oz.), 1 silk pocket-handkerchief (1½ oz.), 1 woollen nightcap (4 oz.), 2 towels (1 lb.), a holdall, containing 1 comb, 1 small hair-brush, 1 tooth-brush, 1 small clothes-brush, 1 pr. of scissors, and a metal soap box (1 lb. 6 oz.), 1 small sponge in bag (3 oz.), 1 housewife (4 oz.), 1 tin of dubbing (3 oz.), 1 portfolio, containing pen, ink, and paper (15 oz.), 1 journal book (9 oz.), 1 cholera belt (6 oz.), 1 calico bandage § (3 oz.), 1 candle lamp with a few candles (1 lb.), 1 tin match-box ‖ (3 oz.), 2 tin plates (14 oz.), 1 cup (in leather bag), containing knife, fork, spoon, pepper and salt pots (1 lb.), 1 India-rubber basin (1 lb.), some tobacco, and 'The Soldiers' Pocket-Book' (1 lb.) The total weight of these articles is 29 lbs. 14 oz., and, as the valise in which they are contained weighs 9 lbs., the whole kit weighs, say, 40 lbs.

The valise forming the bed and holding the above detailed kit measures, when packed, 13 inches in diameter, and is 28 inches long, as shown in sketch (p. 10).

Fig. 1 also shows the valise in plan when opened out for use as a bed,

* *One of these bullock trunks is to be seen in the pattern-room, Horse Guards.*

† *The best water bottles are those made of ebonite, and covered with felt: they can be had at Silver and Co., Cornhill: those holding a little less than 1¼ pints, weigh when empty 13¼ oz.: when full 2 lbs. 3¾ oz. The Sardinian water-bottle, that is now the newest pattern for our army kept in store, is of wood, holds 1⅓ pints, weighs when empty 1 lb. 0½ oz., when full, 2 lbs. 10 oz.*

‡ *The most convenient size is 7 in. by 4 in. I strongly recommend Metallic memorandum books ruled, with the corners rounded off, as the best for field service.*

§ *To be carried on person when in actual presence of the enemy.*

‖ *In damp climates, matches having sulphur on them should be selected.*

and a longitudinal section through it then. It consists of a waterproof sheet 26 in. wide, ending in a cylindrically shaped bag which holds the kit

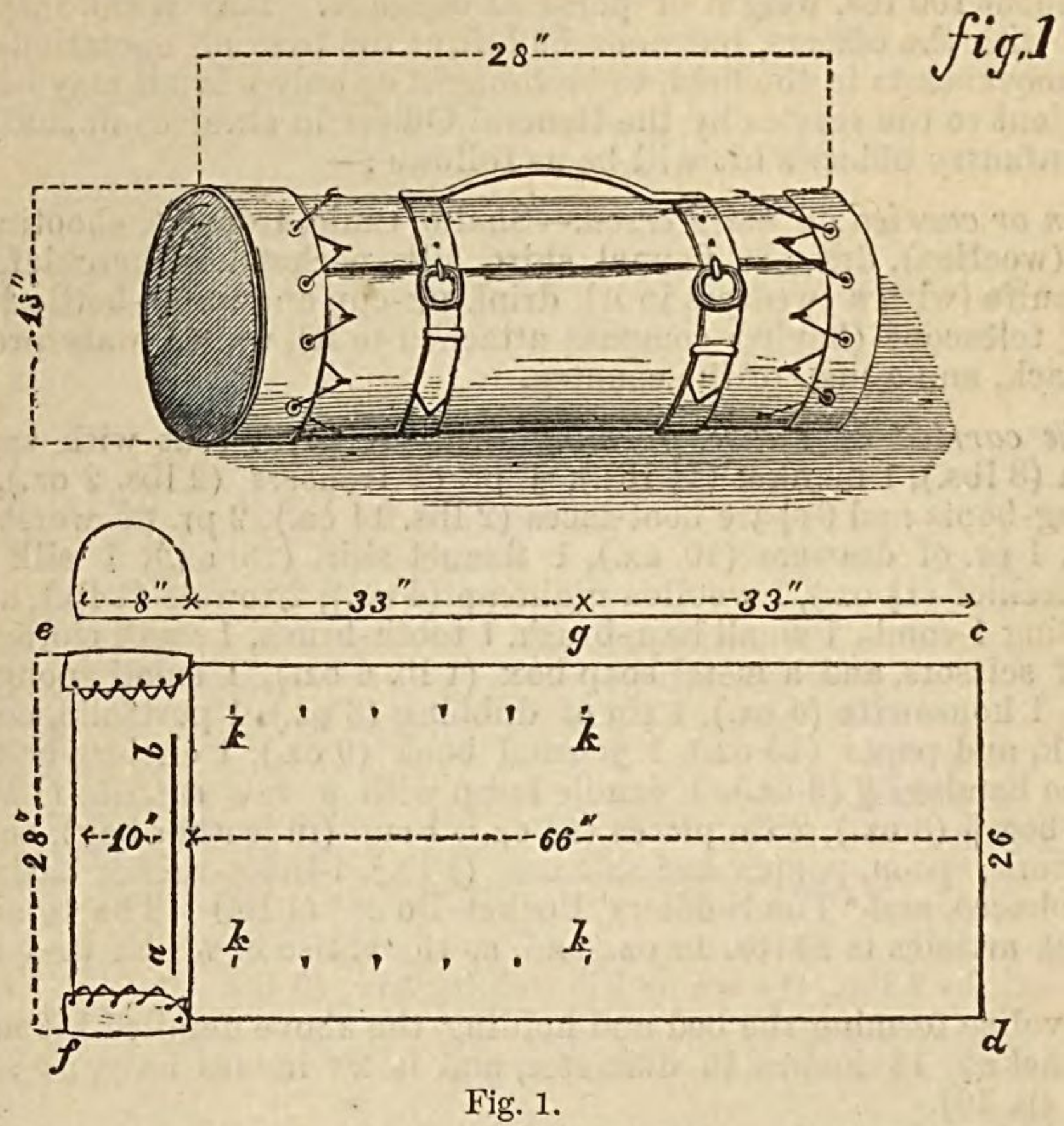

Fig. 1.

and forms the pillow. The opening in this bag (*a b* in sketch) is secured by a couple of straps or strings of soft cord. The bag should be made of light waterproof material except the portion of it (8 inches) which will rest on the ground when the bed is opened out, which is in one piece with the ground sheet that is made of stout waterproof stuff (such as is now used for mail bags) as far as *g*, the portion *g c* (33 inches) being, for the sake of lightness, of less heavy waterproof material. In folding up the bed, the end *c d*, is first doubled back on the pillow at *e f*, the ground sheet in that condition being then rolled round the valise or pillow. In this way no part of the sheet that may have been dirtied from contact with the ground is brought next the bedding. A piece of light serge, 66 in. long

and 30 in. wide, is fastened along the sides and the valise end of the sheet; being open at the end *c d*, a sort of bag is thus formed which if filled with straw, hay, leaves, &c., &c., forms a good palliasse: it is necessary for health to have a woollen substance of this kind between the body and the waterproof sheet. The valise and bedding when rolled up are secured by two leather straps, which are sewn to the sheet for 30 in. from *g* towards *e*; they are united close to *g* by a cross strap, which forms a handle (when the valise is rolled up), after the fashion of the straps commonly used to fasten railway rugs, &c. The valise ends at each side in a cap with edges 3 in. deep, pierced with seven brass-bound eyelet holes. This cap is of the same strong material that the portion of the ground sheet near the valise is made of. Beginning at *g*, at 4 in. from each edge of the ground sheet, is a line of strong brass hooks, *k k* in sketch, 6 in. apart, and extending to the end of the stout waterproof material under valise. Rove loose through the eyelet holes in the cap at end of the valise is a strong soft cord about as thick as a pipe-stopper: this is kept there permanently, so that each time the bed is rolled up there is no lacing in and out through eyelet holes, but the caps are secured to the ground sheet by the slack between every two eyelet holes being passed over the hooks already described as attached to it. Another method for securing the cap, is by substituting loops of a similar cord for these hooks: they are permanently fastened to the ground sheet in the positions indicated for the hooks in the sketch, and the lacing in the other method is dispensed with. The valise and caps are secured by passing the loops through their corresponding eyelet holes in the cap, and then through one another, the end one being fastened by a small leather strap fixed for that purpose to the ground sheet.

The caps may also be entirely dispensed with by making the ground sheet with side flaps of light waterproof material, which, being about 4 inches wide, are turned inwards before rolling it up, so that when secured by the straps already described the ends of the cylindrical package thus formed are waterproof. The bed in this form, although not quite so proof against wet as when the valise is provided with caps, is much simplified, and a little cheaper.

When used in bivouac, the ground should be scraped away to form a hollow for the hips; this adds greatly to comfort. When time or circumstances enable you to raise your bed off the ground, never fail to do so: a couple of planks or a hurdle raised at one or both ends upon some stones are sufficient for this purpose.

For ordinary climates one blanket with a good great-coat reaching down to the ankles is sufficient. I strongly recommend having the blanket doubled, and sewed together along one end, and two-thirds along the side.

I have always found it a good plan to sleep in a woollen cap of some

sort, particularly when bivouacking. I should like to see one served out to every soldier. When tents are used and it is safe to do so, it is a great luxury to take off your boots at night; if you cannot do this, loosen the lacing as much as possible.

Arms.—The sword should be light but sharp. Officers of all ranks and of all branches of the service should have a central fire revolver carrying a heavy bullet.*

Staff officers should have, in addition to the above, a 50-feet measuring tape, a prismatic compass, a little tin colour-box containing Indian ink, burnt siena, Prussian blue, green, and a brush. A couple of pencils, some good steel pens, a block of sketching-paper, and a pair of compasses (a pedometer is useful). An almanack should be specially prepared by the Topographical Department in England for the use of officers embarking for a military expedition, the calculations being made for the latitude and longitude of some central town in the intended theatre of operations. These almanacks should be printed on slips of a size to fit the pocket-book into which they could be pasted. The following is a useful form for them :—

OCTOBER, 1873.

Lat. 7° 0′ *N.* *Lon.* 2° 0′ *W.*

BEARINGS, MAGNETIC. VARIATION, 18° 23′ W.

MOON'S PHASES.

				H. M.	
October	6th	○	Full Moon	5 31	A.M.
„	13th	☾	Last Quarter	6 25	„
„	21st	●	New Moon	10 55	„
„	29th	☽	First Quarter	0 10	„

Date.		Sun.		Sun's bearing at		Moon.		Moon's bearing at	
		Rises.	Sets.	Rising.	Setting.	Rises.	Sets.	Rising.	Setting.
	†	H. M.	H. M.	°	°	H. M.	H. M.	°	°
1	T	6 2	5 58	E. 21 S.	W. 15 N.	2 14 P.M.	—	E. 42 S.	—

* NOTE.—*It is advisable that some revolver should be accepted as the pattern for service, and sold at a cheap price to officers. A small supply of revolver ammunition should be carried with the 1st reserve, and issued to officers as required. The barrel should be very short: those known as 'Thomas's patent' are very good.*

† *Initial letter of the day of the week.*

The staff officer should carry with him, strapped to his saddle, a waterproof-coat (rolled up with his great-coat if there is any likelihood of being separated from his baggage), and a leather case containing pencils, pens, and paper. He should carry all his kit in saddle-bags on one of his spare horses. If heavy rains or very bad weather are to be anticipated, I recommend most strongly that one of the two pairs of boots should be made to come well up the thigh, being so finished inside that the tops can be turned down below the knee in fine weather. A pair of good shooting-boots, made to buckle with straps are very convenient, after a march, to wear when walking about in camp.

Messing is always a difficult matter, for English officers will carry their preconceived notions of comfort into the field with them. They must learn to live as much like the private soldier as possible, and officers commanding battalions should positively forbid the conveyance of private stores with the regimental baggage. As has been said before, all future campaigns must be of short duration, and any officer who cannot make up his mind to live upon the same fare as his men, had better remain at home with his mother.

Staff officers should mess in threes or fours, having provided themselves with a canteen for each mess similar to that recommended for other officers.

The attempt to carry about a table or chair during the active work of a campaign is ridiculous; officers, like their men, must eat their dinners sitting on their beds, or on any large stone that may be at hand.

WHAT ALL OFFICERS SHOULD CARRY IN THEIR HEADS.—Taking it for granted that all officers are well acquainted with the Queen's regulations and the customs of the service, they should endeavour to carry in their heads certain easy mathematical formulæ regarding the measurement of distances, &c. A great deal of course depends on their disposition and their power of perception. Make it a practice to note carefully, even as you whiz along in a railway carriage, the peculiar features of the country, the nature of its fences, &c. This is commonly done by hunting-men from habit, so much so that with them it is a mental operation gone through almost mechanically. Accustom yourself to time the pace at which you travel, to count the number of telegraph poles there are to a mile, and so ascertain how many yards they are apart, &c. As time and distance are the two elements upon which all military movements hinge, officers cannot accustom themselves too much to every-day calculations, regarding them as they bear upon their amusements, or their ordinary routine of duty. I think men accustomed to keep horses are more in the habit of doing so than men who don't ride much. To keep a journal is very good practice; in it should be noted one's daily habits, the events of the day, and general opinions upon them, together with remarks upon the books one reads, the politics of the time, foreign affairs, &c. All such practices tend to impress

useful facts on the memory. It is taken for granted that every officer has a fair knowledge of arithmetic, of at least the first two books of Euclid, of plane trigonometry, of algebra, as far as quadratic equations, and of permanent fortification. They should be able at a glance to distinguish the common vegetable productions, including the various species of timber. For facilitating the measurement of distances, &c., every one should know the exact length of his ordinary pace, and be able to pace yards accurately; he should know the exact length of his foot, hand, cubit, and arms from tips of fingers of left hand, to right ear; he should know the height of his knee, waist and eye, and also the exact proportion that his drinking-cup bears to a pint. The more information regarding the strength, composition, and distribution of the contending armies that an officer can carry in his head, the better.

THE ORGANISATION OF OUR ARMY.

Cavalry.—The organisation of the English cavalry is as follows:—

1, The Household Cavalry; 2, Heavy Cavalry; 3, Lancers; 4, Hussars. There are only 3 regiments of household cavalry; they are armed with cuirass, and steel helmet, heavy sword, pistol, and B.L.R. carbine. The N.C. officers and men must be 6 feet in height. There are 4 regiments of heavy and 11 regiments of medium cavalry; 5 regiments of which are lancers armed with lance, rifled pistol and sword, the rest being armed with sword and B.L.R. carbines, and, with the exception of the Scots Greys, wearing brass helmets. There are 13 regiments of hussars armed as the heavies, except that they have no helmets. The sword used by the cavalry of the line is 36 in. in the blade, weight 2 lbs. 1 oz., or, with scabbard, 4 lbs. 11 oz. The lance is 9 ft. 3 in. long, weight 4 lbs. 4 oz.

The officers' chargers are their private property. The average height of cavalry horses is $15\frac{1}{2}$ hands.

The average net weight of a dragoon is about $11\frac{1}{2}$ stone; of a lancer 11 stone, and of a hussar, 10 st. 3 lbs. The weight of their dress, arms, accoutrements, ammunition, and equipment, worn on the person, is respectively about 31 lbs. 6 oz., 32 lbs. $4\frac{3}{4}$ oz., and 31 lbs. 14 oz. Adding the weight of water-bottle full (2 lbs. $4\frac{1}{2}$ oz.), and of 2 days' rations for the man (4 lbs.), the total weight carried by the horses of our cavalry will therefore be in future:

About 19 stone	2 lbs.	—Heavies.		
,, 18	,, 10	,,	—Lancers.	
,, 17	,, 13	,,	—Hussars.	

To these weights must be added at least one day's corn for the horse.

WAR ESTABLISHMENT OF A REGIMENT OF CAVALRY.

Officers, Non-commissioned Officers, and Men.	Numbers.	Horses. Chargers.	Horses. Troop.	Horses. Draught.
Officers.				
Lieutenant Colonel	1	4		
Majors	1	4		
Captains	8	24		
Subalterns	12	36		
Adjutant	1	3		
Paymaster	1	2		
Quartermaster	1	2		
Medical Officer	1	2		
Veterinary Surgeon	1	2		
Total	27	79		
Serjeants.				
Sergeant Major	1			
Quartermaster Sergeant	1			
Band Sergeant	1			
Paymaster Sergeant	1			
*Armorer Sergeant	1			
Saddler Sergeant	1			
Farrier Sergeant	1			
Sergeant Cook	1			
Trumpet Major	1			
Orderly Room Clerk	1			
Transport Sergeant	1			
Troop Sergeant Majors	8			
Sergeants	24			
Artificers.		..	480	
Farriers	8			
Saddlers	4			
Shoeing Smiths	8			
Wheelers and Saddletree makers	2			
Total Sergeants and Artificers	65			
Trumpeters	8			
Rank and File.				
Corporals	32			
Bandsmen	15			
*Privates	480			
*Drivers (Transport)	23	..	..	44
Total Rank and File	550	79	480	45
Total of all Ranks	650	604		

Summary of Transport, Arms, and Equipment.	Carriages.	Drivers.	Draught Horses.
—			
Without Tentage.			
Waggons, forge	1	2	4
Ditto general service	6	12	24
1† For hospital panniers	..	1	1
Total	7	15	29
For Tentage, &c.			
Waggons, general service	4	8	16
Grand Total	11	23	45

Ammunition.	Other than Lancers.	Lancers.
Cartridges, ball. Martini-Henry. in possession (20 rounds per man).	11,300	..
Cartridges, ball. Martini-Henry. with divisional reserve (20 rounds per man).	11,300	..
Cartridges, ball. pistol in possession (10 rounds per man.)	410	6060

* *If tents are not carried this detail will be, privates,* 488; *divers,* 14; *draught horses,* 28. *No bât-animals allowed.*

Armorer Sergeant to be left at base of operations.

† *For hospital panniers.*

Articles carried on Horse and Horse Equipment.	Weight.		
Saddlery.	stone.	lbs.	oz.
Saddle and pannels *	1	3	8
Stirrup leathers	0	0	11½
Stirrups	0	2	4
Breast-plate	0	1	3
Surcingle	0	1	0
Baggage straps	0	0	8½
1 pair wallets	0	2	0
Shoe cases and 2 shoes	0	2	8
Hide rope	0	0	7½
	2	0	2½
Equipment on Saddle.			
Numnah	0	2	10½
Sheepskin	0	5	8
Hoofpicker	0	0	1½
Corn sack	0	1	14
Mess tin	0	1	6
Nose-bag	0	1	3½
Hay nets	0	2	6
Great-coat	0	7	9
Waterproof cloak	0	3	8
	1	12	2½
Articles in Wallets.			
1 pair drawers	0	0	14½
1 do. socks	0	0	5
1 towel	0	0	7½
1 flannel shirt	0	0	10
Forage cap	0	0	5
Holdall	0	1	0
1 pair ankle boots	0	2	7
1 shoe brush	0	0	3¼
Horse brush	0	0	8
Curry comb	0	0	12
Oil tin	0	0	4
Tin, blacking	0	0	5
Account book	0	0	2
	0	8	3¼
Total weight of equipment	4	6	8¼

* *This saddle is 5 lbs. lighter than the one hitherto in use.*

CAVALRY TRANSPORT.

TRANSPORT required by the REGIMENTAL HEAD QUARTERS in the FIELD for conveyance of CAMP EQUIPMENT LIGHT BAGGAGE, BOOKS, and QUARTERMASTER'S STORES.

Detail: 2 F. Os.; 5 other officers; 7 drivers; 19 chargers, and 13 draught horses.

Articles to be conveyed.	Numbers.	Weight.	Waggons.	Drivers.	Horses.
		lbs.			
Axes { handled, hand	3	10			
Axes { helved { felling	3	11½			
Axes { helved { pick	3	51			
Bars, crow { 5′ 6″	1	31			
Bars, crow { 4′ 6″	1	22			
Blankets { grey field service	6	24			
Blankets { horse (if taken)	(28)	(208)			
Buckets, canvas	16	72			
*Kettles, camp	2	17			
Lanterns, brass, globular	1	2			
Picketing implements { mauls	2	18			
Picketing implements { post, picket	18	99			
Picketing implements { ropes, 16 yards	4	33			
Shoes, horse, sets of 4	12	84	2	4	8
Sacks, corn	6	8			
Shovels	3	13			
Spades	3	16			
†Tents, circular (if taken)	(8)	(720)			
Tools, artificer's sets { smiths	1	208			
Tools, artificer's sets { wheelers and saddletree makers	1	281			
Officers' baggage { field officers	2	160			
Officers' baggage { others	5	250			
Officers' cooking pots	3	60			
Regimental books	..	100			
Kits, dismounted men	..	..			
Quartermaster's stores	..	2000			
Total					
Hospital panniers	..	267	..	1	1
Forge waggon	..	..	1	2	4
Total	..	..	3	7	13

N.B.—The Band is provided for with the Squadron baggage. Each G.S. waggon to carry three or four dismounted men. Small-arm ammunition provided for in "Divisional Ammunition Reserve."

* *Officers find their own cooking utensils.*

† 4 *for officers;* 1 *for drivers;* 1 *for Orderly Room, and* 2 *for Guards.*

TRANSPORT required by a SQUADRON in the FIELD for CAMP EQUIPMENT and LIGHT BAGGAGE.

Articles to be conveyed.	Numbers.	Weight.	Waggons.	Drivers.	Horses.
		lbs.			
Axes { handled, hand . .	6	12			
Axes { helved { felling . .	2	11			
Axes { helved { pick . .	6	51			
Blankets, grey, field . . .	154	616			
Buckets, canvas	4	3			
Forge, portable	1	212			
Hooks, reaping	16	13			
Kettles, camp, Flanders . .	19	161			
Lanterns, brass, globular .	2	4			
Picketing implements { mauls . . .	3	24	1	2	4
Picketing implements { posts . . .	70	385			
Picketing implements { ropes, 16 yards	16	130			
Sacks, corn.	32	54			
Shoes, horse, sets of . . .	4	28			
Shovels	12	58			
Spades	2	11			
Officers' baggage	5	250			
Officers' cooking pots . .	..	40			
Total	..	2863	1	2	4
2nd Line for Tentage, &c.					
Blankets, horse	130	975			
Buckets, canvas	6	5			
Pads and surcingles . . .	130	130	1	2	4
Shoes, horse, sets of 4 . .	4	28			
Tents, circular	14	1260			
Total	..	2398	1	2	4
Grand Total . .	..	5261	2	4	8

NOTE.—Three or four dismounted men to be carried on each G.S. waggon.

Detail of a Squadron: 5 officers; troop sergeant major and sergeants, 8; artificers, 4; trumpeters, 2.

Rank and file, 128; drivers (transport), 4; 15 chargers; 120 troop horses; and 8 draught horses.

RECAPITULATION OF TRANSPORT FOR A CAVALRY REGIMENT.

DISTRIBUTION.	Waggons.		Drivers.	Horses.
	Forge.	General Service.		
Regimental head quarters	1	2	7	13
Four squadrons	..	4	8	16
Total	1	6	15	29
For tents and horse bankets, if taken	..	4	8	16
Grand Total . . . ,	1	10	23	45

The drivers for these carts and waggons to be supplied from the ranks of the regiment; all this Regimental transport to be in charge of the officer commanding the regiment.

Infantry in our army is really only of two sorts, the guards and the line; for although the latter are divided nominally into fusileers, light infantry, rifles, and heavy regiments, there is no material difference in their arms or practical equipment. The standard of height in the guards is always some two or three inches higher than for other regiments. All are armed with Snider (converted Enfield) rifles, weighing 9 lbs. 2 oz., bore 57·7. Bayonet weighs 13½ oz. The two rifle regiments, and all sergeants of other regiments, are armed with the short Snider rifle and sword bayonet; weight of rifle 8 lbs. 12 oz., sword bayonet 1 lb. 11½ oz., scabbard 7½ oz. A packet of 10 cartridges weighs 1 lb. 0¾ oz.

The new pattern arm with which all our infantry is to be armed is the Martini-Henry, measuring from end of butt to muzzle 4 ft. 1 in., or with bayonet fixed 5 ft. 8 in. The rifle weighs 8 lbs. 12 oz., the bayonet 1 lb. 8 oz., and the scabbard 9 oz., the bore is ·451 inch. A packet of 10 cartridges weighs 1 lb. 2 oz.

At present there are 7 battalions of guards (that do not go abroad except in emergent cases of war), and 141 battalions of the line that serve abroad and at home. These 141 battalions have now been grouped two and two (in one instance there are 3 battalions) into 70 sub-districts, and localised in Great Britain and Ireland. To each sub-district belongs two line and two militia battalions, together with the local volunteers. One of the line battalions, belonging to each sub-district, will always be abroad, the other

at home. The recruiting for both battalions is carried on at the brigade depôt of the sub-district.

The Regimental Entrenching Tools to accompany a battalion of infantry will be packed in one cart, and officers commanding battalions will be held responsible for their safety. When not in use they should always be kept packed in the cart; they are to be used for all regimental purposes, such as making trenches round tents, digging latrines, &c., &c., as well as for entrenchments, so as to render unnecessary the issue of a second set of tools for such work. They should be under the immediate charge of regimental quartermasters, who will issue them as required to captains of companies, receiving them back again as soon as they are done with.

Regimental Reserve Ammunition to consist of 30 rounds per man; as each soldier is to carry 70 rounds (40 in pouch, 10 in expense bag, and 20 in valise), there will be with the battalion 100 rounds for every man in it. Three ammunition carts (new pattern) will carry 28,800 rounds of Martini-Henry (each cart carries 9600 rounds), or 26,880 rounds of Snider (each cart carries 8960 rounds). See page 62.

Regimental Transport will be supplied to each battalion immediately as it takes the field; the officer commanding the battalion to be responsible for its efficiency; the drivers (driving from the box of the waggon) to be selected by him from the ranks of the battalion.

One forge waggon, with shoeing-smiths in the proportion laid down under the head of the Veterinary Department, and a veterinary surgeon will be attached to each infantry brigade, to look after the chargers and other horses belonging to it.

WAR ESTABLISHMENT OF A BATTALION IN THE FIELD.

Ranks.	Officers, N.C. Officers, and Men.					Chargers.
	Officers.	Staff Sergeants and Sergeants.	Drummers.	Rank and File.	Total.	
Lieutenant Colonel .	1	..		..	31	2
Majors	2					4
Captains	8					
Subalterns . . .	16					*1
Adjutant	1					1
Paymaster . . .	1					
Quartermaster . .	1					1
Medical Officer . .	1					1
	—					
Sergeant-Major . .		1		..	50	
Quartermaster-Sergt.		1				
Band Sergeant . .		1				
Drum Major . .		1				
Orderly Room Clerk		1				
Armorer Sergeant* .		1				
Paymaster-Sergeant		1				
Regtl. Transport Serg.		1				
Sergeant Cook . .		1				
Colour-Sergeants .		8				
Sergeants . . .		32				
Pioneer-Sergeant .		1				
		—				
Drummers . . .			16		16	
			—			
Corporals . . .				40	1000	
Pioneers & Artificers				13		
Band				20		
Privates†. . . .				902		
Drivers†				25		
Totals .	31	50	16	1000	1097	10

Summary of Transport, Arms, and Ammunition.			
Transport.	Number.	Drivers.	Draught Horses.
Without Tentage.			
Company	8	8	16
Carts { intrenching tools .	1	1	2
Carts { small arm ammunition	3	3	6
Waggons, general service . .	2	4	8
For hospital panniers . . .	..	1	1
Spare	..	2	4
Total	14	19	37
For Tentage, &c.			
Waggons, G.S.	3	6	12
Grand Total	17	25	49

Ammunition.			Per Man.
Carridges, ball.	Martini-Henry	with the soldier { serjeants	40
		with the soldier { rank and file .	70
		in regimental reserve	30
	pistol. .	in possession . . .	30
		in reserve . . .	200

TOTAL ROUNDS of AMMUNITION per Battalion.

Description.	In possession.	Reserve.
Rifle . .	64,880	28,800
Pistol . .	750	5,000

* *For Transport Officer.*

† *If tents are not carried, the detail will be, privates,* 910; *drivers,* 18; *with draught horses,* 36. *Armorer-sergeant to remain at base of operations. No bât animals allowed.*

INFANTRY SOLDIER'S EQUIPMENT IN THE FIELD.

Arms and Accoutrements.	Weight.	Articles Worn by the Soldier.	Weight.	Valise and Articles Carried in it.	Weight.
	lbs. oz.		lbs. oz.		lbs. oz.
Pouches . . .	1 11	Chaco . . .	0 15	Great-coat . .	5 14½
Waistbelt & frog	0 14	Tunic . . .	3 2	Shirt	1 1½
Ammunition (70 rounds) . .	7 5	Shirt	1 1½	Socks . . .	0 4½
		Trousers. . .	1 11	Towel . . .	0 8
Rifle (Snider) .	9 0¾	Braces . . .	0 3¾	Spoon . . .	0 1¾
Bayonet . . .	0 13½	Socks . . .	0 4½	Comb . . .	0 0½
Scabbard . . .	0 4½	Leggings . .	0 10½	Brush . . .	0 3½
Knife & lanyard	0 5	Boots . . .	3 3	Pot of grease .	0 4
Water-bottle (full)	2 10			Housewife . .	0 3
Mess tin . . .	1 5½			Sponge . . .	0 0½
Haversack . .	0 8½			Boots . . .	3 3
				Glengarry cup .	0 4
				Account-book .	0 2
				Valise & straps	3 1
Total . .	24 13¾	Total . .	11 3¼	Total . .	15 3¾

RECAPITULATION.	Weight.
	lbs. oz.
Valise and kit	15 3¾
Arms and accoutrements	24 13¾*
Two days' rations	4 8
Clothes worn	11 3¼
Total carried by the soldier . . .	55 12¾

* *When the Henry-Martini rifle is in use, this weight will be* 1 *lb.* 3¼ *oz. more.*

INFANTRY TRANSPORT.

TRANSPORT required by the REGIMENTAL STAFF of a BATTALION in the FIELD for Camp Equipment Light Baggage, Books, Small Arm Ammunition, Quartermasters' Stores and Intrenching Tools.

Articles to be conveyed.	Numbers.	Total Weight.	Numbers required. Carts.	Numbers required. Waggons.	Drivers.	Draught Horses.
First Line.		lbs.				
Axes, hand, handled	6	12				
Blankets, grey, field	66	241				
Buckets, canvas	10	6				
Forge, portable	1	212				
Hooks, reaping	5	5				
Kettles, camp, Flanders	10	86				
Lanterns, brass, globular	2	4				
Ropes, picket 16 yards	4	32				
Sacks, corn	6	25				
Shoes, horse, sets	4	28				
Tools, chests of. collarmakers'	1	66	..	1	2	4
Tools, chests of. wheelers'	1	281				
Regimental Books	..	100				
Officers' baggage. field officers	3	240				
Officers' baggage. mounted officers	4	200				
Officers' baggage. transport officer	1	40				
Cooking pots, officers'	..	60				
Kits, staff serjeants'	9	180				
Total		1818				
Small arm ammunition	28,800	3840	3	..	3	6
Quartermaster's stores	..	2240	..	1	2	4
Intrenching tools. Axes, helved, felling, 4½ lbs.	16	92				
Intrenching tools. Axes, helved, pick, 6½ lbs.	60	492				
Intrenching tools. Bars, crow 5′ 6″	2	62				
Intrenching tools. Bars, crow 4′ 6″	2	44	1	..	1	2
Intrenching tools. Shovels	100	480				
Intrenching tools. Spades	10	52				
Total	..	1222				
For hospital panniers	..	267	..	..	1	1
Add for spare	..	..	..	..	2	4
Total, first line	..	9387	4	2	11	21
Second Line.						
Blankets, horse	*50	466				
Pads and surcingles	*50	50	..	3	6	12
Tents, complete	*90	8100				
Total, second line		8616	..	3	6	12
Grand Total	..	..	4	5	17	33

DETAIL.		
Horses.	Draught.	21 / 33
	Chargers.	10
Total.	N. C. Officers and Men.	56 / 62
	Officers.	8
Drivers.		11 / 17
Rank and File.		16
Band.		20
Pioneers.		1
Staff Serjeants, including Transport Serjeant.		8
Other Officers, including Transport Officer.		5
Field Officers.		3

* Numbers required for the whole Battalion.

TRANSPORT REQUIRED BY A COMPANY IN THE FIELD FOR EQUIPMENT AND LIGHT BAGGAGE.

ARTICLES TO BE CONVEYED.	Numbers.	Total Weight.	Carts.	Drivers.	Horses.	Detail of a Company.	
		lbs.					
Axes, hand, handled . . .	6	12					
Blankets, field service . . .	125	475					Total.
Buckets, canvas	10	6				Officers . . .	3
Kettles, camp, Flanders . .	16	136					
Ropes, 8 yards	1	8				*N.C.O. and Men*:—	
Sacks, corn	1	4¼	1	1	2	Sergeants 5	
Shoes, horse, sets	2	14				Drummers 2	
Officers' baggage	3	120				Rank and File . 117	125
„ cooking pots	..	20				Driver . 1	
Total . . .		795¼					

For Tentage, see Table of Transport required for the Staff of a Battalion.

RECAPITULATION OF TRANSPORT FOR A BATTALION.	Weight in lbs.	Carts.		Waggons.	Drivers.	Horses.	
		Small Arm Ammunition.	Stores and Intrenching Tools.			Chargers.	Draught.
First Line, without Tents.							
Equipment with Head Quarters . .	..	3	1	2	11	10	21
For Eight Companies	..	..	8	..	8	..	16
Total	..	3	9	2	19	10	37
Second Line, Tents, &c.	..	..	..	3	6	..	12
Grand Total	..	3	9	5	25	10	49

Artillery is divided in our army into horse, field, and garrison batteries. The tactical unit is the battery, but for purposes of administration, the corps is divided into brigades, having generally 8 batteries in each. The men of the horse and field batteries are divided into gunners, drivers, and artificers. Camp equipment is carried by all batteries on its waggons.

A battery of field artillery consists of 6 pieces told off into 3 divisions of two guns, and into 6 subdivisions of one gun each. The projectiles in use are common, segment, and shrapnell shells, and case shot; solid shot is used with 20 prs. Fusees are either time or percussion. Hale's rockets have no sticks : they are 3 pr., 6 pr., 12 pr., and 24 pr.

The draught per horse in all batteries armed with 9 pr. is about 657 lbs., and in those armed with 16 pr. about 789 lbs. (the gunners being dismounted in both instances).

The war establishment of batteries is as follows :—

Officers and Men.	R.H.A.	Field.		Garrison. Battery.
		16-pr.	9-pr.	
OFFICERS.				
Major	1	1	1	1
Captain	1	1	1	1
Lieutenants	3	3	3	3
Surgeon	1	1	1	1
Veterinary-Surgeon	1	1	1	..
NON-COMMISSIONED OFFICERS AND MEN.				
Sergeant-Major	1	1	1	1
Quartermaster Sergeant	1	1	1	..
Sergeants	6	6	6	5
Corporals	6	6	6	5
Bombardiers	6	6	6	5
Gunners	70	87	72	140
Drivers	70	73	62	..
Trumpeters	2	2	2	2
ARTIFICERS.				
Farrier	1	1	1	..
Shoeing Smiths	5	4	4	..
Collar-makers	2	2	2	..
Wheelers	2	2	2	..
Total	179	198	172	164
AMMUNITION.				
Rounds per gun	148	100	148	..

Horses.	R.H.A.	Field.	
		16-pr.	9-pr.
RIDING.			
Officers	15	8	8
Staff-Sergeants	2	2	2
Non-Com. Officers	12	12	12
Farrier	1	1	1
Shoeing Smiths	3	1	1
Trumpeters	2	2	2
Gunners	36	..	..
Spare	6	4	4
Total	77	30	30
DRAUGHT.			
Guns	36	48	36
Waggons: Gun ammunition	36	48	36
Waggons: Forge	6	6	6
Waggons: General service	12	12	12
Spare	12	10	8
Total Horses	179	154	128
ORDNANCE.			
Rifled M.L. guns	6	6	6
CARRIAGES.			
Gun	6	6	6
Waggons: Ammunition	6	6	6
Waggons: General service	2	2	2
Waggons: Forge	1	1	1
Total	15	15	15

The reserves of Ammunition, for Army Corps and for Divisions, are distributed as follows :—

DIVISIONAL RESERVE.

16-PR. R.M.L. GUNS.

72 rounds per gun for—

2 batteries with divisions	12 guns.
⅓rd of 2 batteries in reserve	4 „
Total . . .	16 „

16 × 72 = 1152 rounds [say 1156 *] carried in 4 limber and 7 general service waggons.

9-PR. R.M.L. GUNS.

108 rounds per gun for—

1 battery with divisions	6 guns.
⅓rd battery with cavalry	2 „
1 battery with reserve	6 „
Total . . .	14 „

14 × 108 = 1512 rounds [say 1444 *] carried in 3 limber and 6 general service waggons.

SMALL ARM AMMUNITION.

7 regiments of infantry, each with 990 rifles, or in all 6930 rifles at 40 rounds each.
6930 × 40 = 277,200 [say 278,400 *] carried in 29 carts.

ARMY CORPS RESERVE.

16-PR. R.M.L. GUNS.

8 batteries equal to . . . . . 48 guns.

108 rounds per gun × 48 = 5184 rounds [say 5124 *] carried in 42 general service waggons.

9-PR. R.M.L. GUNS.

7 batteries equal to . . . . . 42 guns.

44 rounds per gun × 42 = 1848 rounds [say 1740 *] carried in 9 general service waggons.

SMALL ARM AMMUNITION.

40 rounds per rifle per division, equal to 3 times divisional reserve, or 831,600 rounds [say 842,400 *] carried in 36 general service waggons.

* For convenience in packing.

DETAIL of DIVISIONAL and ARMY CORPS RESERVES.

The latter in three Divisions.

Officers and Men.	Divisional.	Army Corps, One Division.
OFFICERS.		
Major . . .	1	..
Captain . . .	..	1
Lieutenants . .	2	2
Quartermaster .	1	1
Surgeon . . .	1	1
Vet.-Surgeon .	1	1
NON-COMMISSIONED OFFICERS AND MEN.		
Sergeant-Major .	1	1
Quartermaster Sergeant . .	1	1
Sergeants . .	6	6
Corporals . .	6	6
Bombardiers .	6	6
Gunners . . .	50	50
Drivers . . .	121	87
Trumpeters . .	2	2
ARTIFICERS.		
Sergeant Farrier	1	1
Shoeing Smiths.	6	6
Collar-makers .	3	3
Wheelers . .	3	3
Totals . .	212	178

Horses, Harness, and Saddlery.	Divisional.	Army Corps, One Division.
RIDING.		
Officers	*7	*7
Staff-Sergeants. . .	2	2
Non-Com. Officers .	9	9
Farriers.	1	1
Trumpeters . . .	2	2
Spare	2	2
Total. . . .	23	23
DRAUGHT.		
Carriages gun, spare with limber — 16-pr.	4	4
Carriages gun, spare with limber — 9-pr.	4	4
Carts, S. A. ammunition.	58	..
Waggons — Ammunition — Gun limber — 16-pr.	24	..
Waggons — Ammunition — Gun limber — 9-pr.	18	..
Waggons — Ammunition — general service.	78	116
Waggons — forge and store	18	16
Waggons — rocket . . .	6	..
Spare	20	20
Total Horses .	253	183

Equipment.	Divisional.	Army Corps, One Division
ORDNANCE.		
Carriages — Gun — 16-pr.	1	1
Carriages — spare — 9-pr.	1	1
Carts, small arm . .	29	..
Waggons — Ammunition — Gun limber — 16-pr.	4	..
Waggons — Ammunition — Gun limber — 9-pr.	3	..
Waggons — Ammunition — general service.	13	29
Waggons — forge and store .	3	4
Waggons — rocket	1	..
Total Carriages .	55	35
AMMUNITION.		
Number of rounds carried — per gun — 16-pr.	72	108
Number of rounds carried — per gun — 9-pr.	108	44
Number of rounds carried — per rifle .	40	40

* Two private property, Veterinary Surgeon.

The guns used in the field are as follows :—

NATURE OF GUN.	Weight of Gun.	Calibre.	Weight of Gun and Carriage (packed).	Number of Rounds in Limber and on Gun.	Weight of Limber Loaded.	Total Weight behind Team (Gunners Dismounted).	Number of Rounds in Waggon.	Weight of Waggon Loaded.	Range at Elevation of 9°.
	lbs.	in.	lbs.		lbs.	lbs.		lbs.	yds.
B L.R. 20 pdr A.	1792	3·75	3581	18	..	5425	48	4256	3500
Do. 12 do.	896	3·00	2240	34	1904	4144	90	4844	3400
Do. 9 do.	672	3·00	1876	34	1680	3556	90	4508	3000
M.L.R. 16 pdr (wrought iron) . . .	1344	3·60	2912	28	1744	4728	72	4556	3400
Do. 9 do. do. . . .	896	3·00	2240	40	1701	3941	108	4506	3040
Do. 7 pdr (steel) for mountain service	150	3·00	..	..	..	..	..	..	1400*
Do. do. (bronze)	200	3·00	417	..	..	..	..	..	1900*

The following table describes the ordnance, not intended for the field, now in general use :—

Calibre.	Name and Length.	Weight.	Calibre.	Name and Length.	Weight.
in.		cwt.	in.		cwt.
9	9 in. M.L.R. gun, 12′ 3″	240	8	8 in. howitzer, 4′. . .	22
7	7 in. „ „ 11′ 9½″	140	6·375	32 pdr 9′	50
6·3	64 pdr „ „ 9′ 3½″	64	5·823	24 pdr 9′ 6″	50
4·75	40 pdr A. gun, 10′ 1″ .	35	5·292	18 pdr 8′	38
	SMOOTH BORE CAST IRON.			MORTARS.	
10	10 in. shell gun, 9′ 4″ .	86	13	13 in. 3′ 3·65″ . . .	36
10	10 in. howitzer, 5′ . .	42	10	10 in. 2′ 5″	18
8·12	68 pdr 10′ . . . . . ,	95	8	8 in. 2′ 1·23″. . . .	9
8	8 in. shell gun, 8′ . .	54	4⅖	Coehorn, 1′ 1″ . . .	¾

From tip to tip of axle, the gun carriages and waggons measure 6 ft. 5 in.; gates and passages should therefore have a minimum width of 7 ft. 6 in. to

* With common shell. The exact elevation for these ranges is respectively 9° 15′ and 9° 11′.

allow artillery to pass. The diameter of field carriage-wheels is 5 ft. The track of field artillery carriages is 5 ft. 1 in. outside measurement.

Field guns can fire 2 rounds a minute, the pieces being laid at each round. For frontage required by artillery, see "POSITIONS," *post.*

The artillery carry on their carriages (already detailed) all their camp equipment, materials for repairs, &c., &c., and the officers' baggage. The personal equipment for men is similar to that of the cavalry.

The proper establishment of men and horses for field artillery is to be estimated thus:—Having provided the exact number of gunners required to work the guns, and of drivers and horses required for the guns and carriages, add one-tenth as "spare." All men and horses beyond the totals thus arrived at should be left at base of operations.

Engineers.—At present there are 3 troops of R.E. train (one being a telegraph troop) and 40 companies. The men are equipped like infantry, except that they are armed with a breach-loading Lancaster carbine (8 lbs. $3\frac{1}{2}$ oz.) and sword bayonet (1 lb. $8\frac{1}{4}$ oz.).

See page 32 for particulars about pontoons.

The personal equipment of the R.E. is similar to that laid down for cavalry and infantry, according as the men are mounted or not.

FIELD PARK TO BE ATTACHED TO COMPANY IN RESERVE.

Ranks, &c.	Officers, N. C. Officers, and Men.						Horses.		
	Officers.	N. C. Officers.	Buglers.	Sappers.	Drivers.	Total.	Riding.	Draught.	Total.
Lieutenants . . .	1	..	..	..	..	1	1	..	1
Sergeants . . .	..	1	..	..	..	1	1	..	1
Corporals . . .	..	1	..	..	..	1	1	..	1
2nd Corporals . .	..	1	..	..	..	1	1	..	1
WAGGONS.									
3 store	..	..	..	..	6	6	..	12	12
1 office	..	..	..	..	2	2	..	4	4
Camp equipage and tentage . .	..	..	..	..	2	2	..	4	4
1 miners . . .	..	..	..	..	2	2	..	4	4
1 forge	..	..	..	..	2	2	..	4	4
1 printing* . . .	..	..	..	..	2	2	..	4	4
1 photographic* .	..	..	..	..	2	2	..	4	4
Spare men, &c. . .	..	..	..	..	2	2	2	2	4
Total . . .	1	3	..	..	20	24	6	38	44

* *Special.*

WAR ESTABLISHMENT OF A FIELD COMPANY.

Ranks, &c.	Officers, N. C. Officers, and Men.						Horses.		
	Officers.	N. C. Officers.	Buglers.	Sappers.	Drivers.	Total.	Riding.	Draught.	Total.
Major	1						2		
Lieutenants	4	..	..	..	..	6	8	..	11
Surgeon	1						1		
Sergeant	..	7					1		
Corporals	..	7	..	..	..	21	1	..	3
2nd Corporals	..	7					1		
Buglers	..	..	2	..	..	2	1	..	1
Carpenters	..	..	..	32					
Masons	..	..	..	28					
Bricklayers	..	..	..	14					
Smiths	..	..	..	14					
Wheelwrights	..	..	..	4					
Coopers	..	..	..	2					
Painters	..	..	..	6					
Tailors	..	..	..	4	..	137			
Collar-makers or shoemakers	..	..	..	4					
Clerks	..	..	..	3					
Printer	..	..	..	1					
Telegraphists	..	..	..	2					
Photographer	..	..	..	1					
Miners and quarrymen	..	..	..	22					
Pack equipments	..	..	..	..	4	4	..	4	4
3 store waggons	..	..	..	..	6		..	12	
camp equipage	..	..	..	..	2		..	4	
office do.									
1 tentage do.	..	..	..	..	2	22	..	4	28
1 forge do.	..	..	..	..	2		..	4	
Spare men & horses	..	..	..	..	4		..	4	
Bâtmen, &c.	..	..	..	..	6		..	..	
Total	6	21	2	137	26	192	15	32	47

Detail of the train included in above Establishment.

- 1 Lieutenant.
- 1 Sergeant.
- 1 Corporal.
- 1 2nd Corporal.
- 26 Drivers.
- 38 Horses (1 officer, 2 horses; 29 N. C. O. and men; 36 horses).

WAR ESTABLISHMENT OF A TELEGRAPH TROOP.

Officers and Men.	Right Half Troop.	Left Half Troop.	Total for One Troop.
OFFICERS.			
Major	1	..	1
Captain	..	1	1
Lieutenants	2	2	4
Quartermaster	1	..	1
Surgeon	1	..	1
Veterinary - Surgeon	1	..	1
	6	3	9
NON-COMMISSIONED OFFICERS AND MEN.			
Troop Sergeant-Major	1	..	1
Troop Quartermaster Sergeant	1	..	1
Sergeants	4	6	10
1st Corporal	5	4	9
2nd Corporal	4	5	9
Sappers	45	45	90
Drivers	64	61	125
Trumpeters	1	1	2
ARTIFICERS.			
Carrier and Carriage Smith	1	..	1
Sergeant Artificer	..	1	1
Sergeant Telegrapher	1	..	1
Corporal Artificers	1	1	2
Corporal Telegraphers	2	2	4
Shoeing and Carriage Smiths	2	3	5
Collar-makers	2	1	3
Wheelers	2	1	3
Carpenters	1	2	3
Telegraphers	6	6	12
Totals	149	142	291

Horses, Saddlery, and Harness.	Right Half Troop.	Left Half Troop.	Total for One Troop.
HORSES.			
RIDING.			
Officers	*12	*6	*18
Staff Sergeants	2	..	2
Non.-Com. Officers	6	8	14
Signallers	12	12	24
Farrier	1	..	1
Shoeing Smiths	..	1	1
Trumpeter	1	1	2
Total	34	28	62
DRAUGHT.			
Waggons: Wire	36	36	72
Waggons: Office	8	8	16
Waggons: Store	8	8	16
Waggons: Boat	4	4	8
Waggons: Forge	4	4	8
Spare	8	8	16
Total Horses	102	96	198
SADDLERY, SETS.			
Officers	†5	3	8
Non.-Com. Officers and Signallers	22	22	44
HARNESS.			
Double sets wheel, R.E. pattern	34	34	68
Pack	1	1	2

Equipment.	Right Half Troop.	Left Hand Troop.	Total for One Troop.
CARRIAGES.			
Waggons: Wire	6	6	12
Waggons: Telegph. Office R.E. Pattern	2	2	4
Waggons: Store	2	2	4
Waggons: Boat	1	1	2
Waggons: Forge	1	1	2
Total	12	12	24
ARTIFICERS' TOOLS.			
Carpenters' sets	1	1	2
Collarmakers' ,,	2	2	4
Farriers' ,,	1	1	2
Painters' ,,	1	1	2
Smiths' ,,	1	1	2
Telegraphers' ,,	9	8	17
Wheelers and saddletree makers' sets	1	1	2
Whitworth's stocks and dies, sets	1	1	2
MATERIALS FOR REPAIRS.			
Carpenters'. Collar-makers'. Smiths'. Wheelers and Saddle-tree makers'	Sufficient for three months.		

A Half Troop to be attached to each Army Corps.

All private property. † Veterinary Surgeon provides his own saddlery.

WAR ESTABLISHMENT OF PONTOON TROOPS.

Officers and Men.	No.
Major (Director of Bridging) . . .	1
Captain } Assistants	1
Lieutenants } Ditto .	4
Quartermaster . . .	1
Surgeon	1
Veterinary Surgeon .	1
	9
NON-COMMISSIONED OFFICERS AND MEN.	
Troop Sergeant-Major .	1
Troop Quartermaster-Sergeant . . .	1
Sergeants	10
1st Corporals . . .	12
2nd Corporals . . .	12
Pontoniers	100
Drivers	150
Trumpeters	2
ARTIFICERS.	
Farrier and Carriage Smith	1
Sergeant Artificer . .	1
Corporal Artificers . .	3
Shoeing and Carriage Smiths	8
Collar-makers . . .	4
Wheelers	4
Carpenters	4
Total . . .	322

Horses, Saddlery, and Harness.	No.
HORSES.	
Riding.	
Officers	18*
Staff Sergeants . .	2
Non-Com. Officers .	12
Farrier	1
Shoeing Smiths .	2
Trumpeters . .	2
Spare	1
	38
Draught.	
Waggons: Pontoon	120
Waggons: Trestle	24
Waggons: Store .	30
Waggons: Office .	4
Waggons: Forge .	6
Spare	24
Total Horses .	246
SADDLERY, SETS.	
Officers	8†
Non-Com. Officers .	20
HARNESS.	
Double sets, wheel, R. E. pattern .	104

Equipment.	No.
CARRIAGES.	
Waggons: Forge . .	1
Waggons: Office . .	1
Waggons: Pontoon .	20
Waggons: Trestle . .	4
Waggons: Store . .	5
Total . . .	31
ARTIFICERS' TOOLS.	
Carpenters' . . sets	2
Collar-makers'. . „	4
Farriers' . . . . „	1
Painters' . . . . „	8
Smiths', G. A. S., with 36 lb. vice . sets	1
Tinman's . . . . „	1
Tools, shoeing . . „	4
Wheelers' and Saddle-tree-makers' . sets	1
Whitworth stocks and dies, 1¼″ to ¼″ with tray . . . . sets	1
MATERIALS FOR REPAIRS.	
Carpenters, Collar-makers, Saddletree makers, Smiths, Tinsmiths, and Wheelers . . .	Sufficient for 3 months.

* All private property. † The Veterinary Surgeon provides his own saddlery.

The Civil Departments with an Army in the field are, the Control, the Medical, and the Veterinary Departments.

The Control Department is responsible for all land and inland water transport—for the supply and custody of provisions, forage, fuel, and light

—all war departmental stores, including arms and ammunition—for medical comforts and hospital equipment, and, finally, for the raising and movement of funds.

The Control Department is divided into three administrative ranks, viz., controller, deputy controller, and assistant controller, ranking respectively with major-general, colonel, and lieutenant-colonel.

For executive purposes of supply and transport, into the three ranks of commissary, deputy commissary, and assistant commissary, with the respective relative rank of major, captain, and lieutenant.

For pay duties, into the three ranks of paymaster, deputy paymaster, and assistant paymaster, ranking likewise with major, captain, and lieutenant.

The Army Service Corps, officered by the afore-mentioned, consists of clerks, tradesmen, mechanics, skilled labourers, drivers, &c., required for the various duties connected with supply, store, pay, and transport.

The details of the establishment of a company of transport and of a company of supply (the units into which the Army Service Corps is divided), are given on next page.

The following extract from the Revised Army Regulations, vol. iv., defines the duty and position of the controller :—

'The controller will conduct his duties under the direct orders of the officer commanding in the district or station to which he may be attached. He will be the adviser and agent of the officer commanding in all matters connected with the raising and issue of money, the supply of provisions, stores, clothing, and transport. He will relieve him, as far as possible, from details connected therewith. The controller will hold towards the officer commanding, and towards the heads of other departments within the command, with reference to control services, a position analogous to that held by the officers of the general staff with reference to military services, excepting that while the controller is under the immediate command of the officer commanding, he is at the same time responsible to the S. of S. for War, that the duties of his department are conducted in strict accordance with the instructions laid down in these Regulations, and with any special directions which may have been given to his predecessors, or which may, from time to time, be conveyed to him.

Commissaries are charged with the execution of all details connected with supply and transport, and requisitions and demands for these services should be sent by officers commanding corps and others direct to them. In case of doubt as to the correctness of the demand, the commissary will submit the question for the decision of the controller.

All demands are to contain full and exact details as to the number and particular description of every article required. The responsibility as to the correctness of the professional details will rest with the officer demanding the stores.

The following is the control establishments for a brigade, division, and an army corps.

A BRIGADE OF INFANTRY.

—	Officers.				—							
	Commissaries.	Deputy Commissaries.	Assistant Commissaries.	Non-commissioned Officers and Men.		Waggons.	Carts.	Water Carts.	Draught Horses.	Riding Horses.	Total Horses.	Non-commissioned Officers and Men.
Supply..	..	1	..	6	Transport	7	2	..	32	2	34	20

Supply.—1 clerk, 2 issuers, 3 labourers.
Transport.—2 Non-commissioned officers, 16 divers, 2 bâtmen, orderlies, &c.
This transport provides conveyance for the baggage of the brigade staff and for one day's supply of provisions, &c.

A BRIGADE OF CAVALRY.

—	Officers.				—							
	Commissaries.	Deputy Commissaries.	Assistant Commissaries.	Non-commissioned Officers and Men.		Waggons.	Carts.	Water Carts.	Draught Horses.	Riding Horses.	Total Horses.	Non-commissioned Officers and Men.
Supply..	1	..	1	7	Transport	5	3	..	26	3	29	19

Supply.—1 clerk, 3 issuers, 3 labourers.
Transport.—2 Non-commissioned officers, 13 divers, 4 bâtmen, orderlies, &c.

A DIVISION OF INFANTRY.

—	Officers.				Total Officers.	Transport.							Supply. Non-commissioned Officers and Men.
	Assistant Controller.	Commissaries.	Deputy Commissaries.	Assistant Commissaries.		Waggons.	Carts.	Water Carts.	Draught Horses.	Riding Horses.	Total Horses.	Non-commissioned Officers and Men.	
Divisional head-quarters . .	1	1	2	1	5	5	1	..	22	8	30	17	12
2 brigades, infantry . .	..	..	2	..	2	14	4	..	64	4	68	40	12
1 battalion, rifles 1 regiment, cavalry . . . 2 batteries, field artillery.	..	1	..	1	2	5	3	..	26	3	29	19	7
Royal Engineers, military police, reserve ammunition column.*	..	..	..	1	1	..	1	..	2	1	3	3	3
Total . .	1	2	4	3	10	24	9	..	114	16	130	79	34

* With head-quarters.

Includes *transport* for one day's supply of provisions and small reserve of camp equipage, &c., also staff baggage.

CONTROL ESTABLISHMENT.

—	Officers.						Supply Companies.			
	Deputy Controller.	Assistant Controller.	Commissaries.	Deputy Commissaries.	Assistant Commissaries.	Total.	Clerks and Staff Sergeants.	Issuers.	Tradesmen and Rank and File.	Total.
Staff, head-quarters, Army Corps	1	..	2	2	1	6	3	2	3	8
3 divisions of infantry . . .	..	3	6	12	9	30	15	36	51	102
1 brigade of cavalry . . .	..	..	1	..	1	2	1	3	3	7
Reserve artillery (5 batteries), Engineers and police, 4 troops and companies .	..	..	1	..	1	2	1	3	3	7
Bakery train*	..	..	1	1	..	2	4	6	112	122
Butchery train							1	2	32	35
Add officers, staff, and spare horses for 5 companies of transport	..	..	..	5	10	15	..	..	..	..
Add officers and staff of 2 companies of supply and spare men	..	..	..	2	2	4	4	..	7	11
Grand Total . . .	1	3	11	22	24	61	29	52	211	292

* The bakery to consist of 3 steam and 30 Aldershot ovens.

FOR AN ARMY CORPS (ALL RANKS).

Transport for Staff and Supply.																
Carriages.								Horses.				Transport Companies.				Detail of Riding Horses.
General Service Waggons.	Spring Carts.	Forge Waggons.	Steam Ovens.	Baking Vans.	Bread Vans.	Butchery Waggons.	Water Carts.	Draught.	Riding.	Pack.	Total.	Non-commissioned Officers.	Batmen, Orderlies, &c.	Drivers.	Total.	Officers. Men.
6	1	..	..	..	..	..	..	26	11	..	37	1	7	13	21	
72	27	..	..	..	..	..	..	342	48	..	390	20	46	171	237	
5	3	..	..	..	..	..	..	26	3	..	29	2	4	13	19	
5	3	..	..	..	..	..	..	26	3	..	29	2	4	13	19	
5	..	..	3	14	14	..	7	158	12	..	170	12	5	79	96	
..	5	..	..	..	..	5	..	30	1	..	31	2	..	15	17	
5	..	10	..	..	..	..	..	110	32	..	142	64	89	55	208	
..	1	..	..	..	..	..	..	2	4	..	6	..	2	1	3	
98	40	10	3	14	14	5	7	720	114	..	834	103	157	360	620	

The war establishment of the companies of the Army Service Corps is as follows :—*

ESTABLISHMENT OF A COMPANY OF TRANSPORT.				ESTABLISHMENT OF A COMPANY OF SUPPLY.	
Establishment.	Nos.	Horses. Riding or Draught.	Horses. Draught.	Establishment.	Nos.
Deputy Commissary	1	1	..	Deputy Commissary . .	1
Assistant Commissary	2	2	..	Assistant Commissary .	1
Officers	3	..	..	Officers . .	2
3rd-class Staff Sergeant acting as Company Sergeant Major. .	1	1	..	1st-class Staff Sergeants .	2
3rd-class Staff Sergeant acting as Company Quartermaster Sergeant.	1	..	..	2nd-class Staff Sergeants .	2
				3rd-class Staff Sergeants .	6
3rd-class Staff Sergeant acting as Company Wheeler Sergeant .	1	..	..	Sergeants	12
3rd-class Staff Sergeant acting as Company Farrier and Carriage Smith	1	1	..	Corporals	15
3rd-class Staff Sergeant acting as Company Saddler Sergeant .	1	..	..	2nd Corporals	15
Sergeants	6	6	..	Buglers	1
Corporals	6	..	..		
„ acting as Wheeler. . .	1	..	..	Privates	52
„ „ Saddler . . .	1	..	..		
„ „ Farrier, &c. .	1	..	..		
„ „ Carriage Smith.					
2nd Corporals	4	..	..		
Rank and File Shoeing and Carriage Smiths	2	..	..		
Trumpeter	1	1	..		
Privates	80	..	79		
All Ranks	110	12	79	All Ranks .	107
Horses	91	..	..		

* These Companies are calculated on a footing which will allow of their being divided at once, upon entering upon active service, into two companies each, and to be aug-

Land Transport.—A most difficult question for all generals. Happy is he who can reduce the amount of impedimenta to be carried. In our next war it is hoped that the men of the Transport Companies will be dressed and equipped roughly, but in a workmanlike manner, for the hard work they have to do. Calls upon the line for whole battalions of soldiers to do the transport work should not be permitted. Our waggons should be light, and not, as they are sometimes, so heavy that the horses can scarcely draw them when loaded. Our artillery waggons and equipment are the heaviest in any army. They are not only calculated to support the work of an ordinary campaign, but to be proof against every possible accident or contingency that can befall them in any possible part of the globe. Our transport and ambulance waggons are constructed upon plans prepared by the same department that makes our gun carriages; and the result is, our transport material is very cumbersome. It is better to have light carts and waggons, and undergo the inconvenience of an occasional break-down and loss of a waggon, than that every cart and waggon should be so heavy that no break-down is ever possible. The loss of a waggon now and then is nothing, but the waste of strength in draught occasioned by heavy material is a serious matter.

In the British army there is a prejudice in favour of pack animals, which has come down to us from the Peninsular war. Nearly all our regulations regarding baggage to be carried in the field are based upon the calculation of what bât animals can carry. The worst transport, and the most difficult to manage, is that by pack animals. Wars in Abyssinia are the exception. As a rule, there will always be field artillery with an army, and wherever it can go wheeled transport can follow. Pack animals are continually being laid up with sore backs. A train of baggage is on the road, say, ten hours; during that time the animals have no rest, as they cannot be unloaded during temporary halts. It is difficult and tedious to load them well, and loads frequently fall off, occasioning delay and confusion.

The question of driving *versus* riding is now being considered upon its true merits, and it is to be hoped that nearly all conveyances will be driven in future. A horse loses one-half his power of sustained draught by having a driver on his back. During the late war in America every species of transport was tried; animals, whether mules or horses, carrying loads on their backs, were given up at an early period of the war, and latterly the whole transport of both armies, except the conveyance of the sick, was

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mented with rank and file and horses locally, or otherwise as may be found expedient, there being sufficient trained officers and non-commissioned officers in each company for the purpose.

DESCRIPTION OF WAGGONS AND CARTS NOW IN USE.

	Names of Waggons, Carts, etc.	Number of Horses.	Weight complete with Pole or Shafts, Drag-chain, &c. &c.	Weight of Load.	Internal dimensions of Body (partitions removed). †L.		W.		D.		Track (outside measurement) in Feet and Inches.		Tonnage for Shipment.	Remarks.
			cwt.	cwt.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	tns.	
*1	Flanders waggon	4	16½	30	10	1½	3	6¼	1	7	5	2	5·00	
2	Canadian do. .	2	13	20	9	8½	3	2	1	3	4	8	5·49	
3	Genl. service do.	4	16¼	30	8	8½	3	11¾	2	0	5	10	3·50	Equirotal wheels (Jacob's lock).
4	Do. do. on springs	4	23¼	30 to 40	10	1	4	3	2	0	5	2	4·17	Colonel Erskine's pattern (straight body).
5	Do. do. cranked body . . .	4	21	30 to 40	4 5	7½ 8¼	3 3	10¼ 10¼	1 2	10½ 9¼	5	2	7·68	Size of body. Do. limber
6	Bread and meat waggon . .	4	30	30 to 40	4 5 8	7½ 8¼ 8	3 3 4	10¼ 10¼ 4½	1 2 1	10½ 9¼ 10	5	2	8·60	Size of body. „ limber. „ top.
7	Travelling bakery waggon	4	25	30 to 40	as No. 6						5	2	8·60	
8	Light supply do.	2	15¼	20	8	4¼	4	4½	1	8	5	2	3·16	On springs.
9	Ambulance do.	4	16½	12	9	2½	4	3½	1	10	5	2	4·50	Equirotal wheels (Jacob's lock).
10	Do. do. (light)	2	16	12	9	5¼	4	3	1	8	5	2	3·78	Dr. Lawson's committee.
11	S.A.A. waggon	4	11 10½	14½ 8½	3 3	10 9½	3 1	2 10	1 1	7¼ 6½	5	2	3·96	Body (10 compartments). Limber (12 do.).
12	Forge do. . .	4	32	..	..		..		..		5	2	5·90	
13	Spring cart . .	2	12¼*	20	6	0	4	0	1	11	5	2	2·44	Col. Erskine's pattern.
14	Tip do. . .	2	11¾	20	6	0	4	0	1	11	5	2	2·11	
15	Butchery do. on springs . .	2	12¼	20	6	0	4	0	1	11	5	2	2·44 0·70	Col. Erskine's pattern. Tank.
16	Cavalry cart .	2	9	15	5	6	3	4¼	1	9	5	2	2·82	
17	Medical store cart	2	7¼	15	5	7	3	4¼	1	7	5	3	2·27	
18	Do. on springs	2	8	15	5	7	3	4¼	1	7	5	3	2·35	
19	S.A.A. cart . .	2	8½	11¼	3	9	3	1½	1	4¼	5	2	2·46	In 8 compartments for 16 boxes.

* Nos. 5, 6, and 7 are of the same pattern. No. 8 is suitable for general service as well as for medical services, and will be similar in pattern to No. 10; Nos. 12 and 14 are of similar pattern. Nos. 4, 5, 6, 7, 8, 10, 12, 13, and 14, are all of new patterns.

† L. stands for length, W. for width, and D. for depth.

performed by long waggons drawn by 6 mules or horses, and driven by 1 man, who rode the near-wheeler. Animals of the transport service require but little grooming during war, so that 1 man is ample for the care of 4. The men should be armed solely with a good central fire revolver, and be clothed in easily-fitting blouses made like Norfolk jackets. All iron-work about the carts and harness should be lacquered. The men should be better paid than the other branches of the service, and only steady men allowed to enter it.

Draught for transport purposes should be calculated at from 10 to 12 cwt. per horse, for all stores in flat countries with ordinarily fair roads. A horse moving at a walk can, for ten hours, exert a force twice as great as a horse, moving at a trot, can for five hours.

The new pack saddle weighs 27 lbs. complete.

It is most desirable that for all transport, half the horses in every team should have collars, and half be provided with breast straps. If this was made the rule we should seldom have horses rendered unfit for draught during a campaign; for a horse becoming collar-galled could have the breast strap from another horse placed on him, and *vice versâ;* by the time he became galled from the breast strap, the old gall would generally be well again, and he could then work with a collar once more, so that really we should lose the services of but very few horses from sore shoulders.

The waggons used during the Red River expedition weighed, complete with pole and drag-chain, 11 cwt. 1 qr.: they were drawn by 2 horses each; their ordinary load over the very bad road used was from 1600 to 1900 lbs. The road was very rough, and they stood the work well. Similar waggons are commonly used all over Western Canada. A number of two-wheeled carts were tried over the same road at first starting, but after a couple of days' trial they were given up, the road being too hilly for them.

LOADING OF PACK ANIMALS.—1st. Attach the end of the loading rope at the lower fore-ring of the saddle, pass it loosely through the lower hind ring, and then through the upper hind ring or hook.

2nd. The load (which should always be as compact as possible) is then laid against the lower part of the saddle, and the end of the rope passed through the slack which hangs between the two lower rings; it is then passed through the upper fore ring or hook, and secured.

Great judgment is required in loading pack animals, and care should be taken that the animals are not over-weighted, that the load is well put on, that it is neither pitched too high upon the saddle, thereby causing it to roll upon the back, nor too low, which adds to the weight and encumbers the animal, but that the lower line of the load should be even with the shoulders.

Ladders will be found of great service in loading pack animals.

ANIMALS USED FOR TRANSPORT PURPOSES.

THE HORSE may be said to be in the prime of life from 5 to 10 years old; he weighs from 1000 to 1200 lbs., according to his height: the former is for the saddle, the latter for the draught horse. For cavalry and artillery purposes his minimum height should be 15 hands 2 inches. The average walk of a horse is a mile in 16 minutes, 3·75 miles an hour, making 120 strides (110 yards) each minute, the stride being 0·916 yard; the average trot is a mile in 8 minutes 7·5 miles an hour), making 180 steps (220 yards) each minute, the stride being 1·22 yards.* This is a slow trot: when going at a good pace, a horse trots easily 8½ miles an hour; the gallop is about 100 strides (352 yards) each minute, that is, at the rate of 12 miles an hour, the stride being about 10 ft. The gallop of manœuvre in our cavalry is at the rate of 11 miles an hour. A "horse's length" is 8 ft. A horse occupies in ranks 3 ft. × 10 ft., and when picketed, from 3 to 6 ft. × 9 ft.; he should have in stables not less than 1200 cubic feet, stalls should be from 4 ft. 5 in. to 5 ft. × 9 ft. When horses are used as pack-animals, their load should be 200 lbs., including pack-saddle. It has now been settled that all horses are to be picketed to ropes stretched between picket-posts or waggons.

The diet of horses should be carefully attended to, and an occasional change is most beneficial; half a bushel of carrots a day per horse has an excellent effect. Green food can be given occasionally with great advantage when horses are not doing hard work, but great care must be taken, when in the field, that horses do not eat as much as they like; whole squadrons of horses have died in a night from doing so. The daily ration of forage, whatever it may be, should be divided into three equal feeds, given one in the morning, one at mid-day, the other in the evening. They should also be watered early in the morning: always give river or lake-water in preference to that from springs or wells. On the march, very little should be given before starting; let them drink a little frequently during the march. When picketed for the day, let them have as much as they like, taking care that they are cool at the time. Horses will eat leaves when grass is not to be had; those of the elm are the best. Chopped straw is a good substitute for hay; horses have done work for some considerable time on the thatch taken off houses. In rainy weather, grass should be piled in heaps, and the driest parts given first. When it can be done, it is a good plan to crush all corn, beans, and peas; when this cannot be done to the two last, they should be soaked in water for a few hours. Give sparingly all food that the horse is not accustomed to. Grooming in moderation is all that horses on service should have. That continual grind at 'stable' wears out men's spirit, and it is far from certain whether

* A good trotter will do from 7 to 8 ft. at a stride.

(carried to the extent it is in our service) it does not render horses very susceptible to cold when picketed in the open in bad weather, by opening the pores of the skin too much. In this, as in most other things about our army, we try to carry into the field the habits of life in barracks in England, and 'go in' too much for appearance.

In grooming, begin cleaning at the off hind-quarter, and go to the head; first wisp and rub the dirt and dust out, and then brush until quite clean. All brushing is to be done against as well as with the grain, preserving as much as possible a straight arm. No circular motions are to be allowed. The hand not immediately in use must be kept upon the horse, to prevent his closing too much on the groom. The curry-comb is also to be kept on the back of the hand, and never to be used on the horse.

Immediately after each day's march the feet are to be picked and carefully examined, heads and legs thoroughly wisped, and feet washed, the backs carefully examined to see that they have not been galled or hurt in any way. The shoes should be looked to and loose ones refastened. All mounted officers should see to this themselves, as grooms are careless. Wounds occasioned by kicks and sprains should be continually fomented with hot water at first, to reduce the pain and inflammation; cold water and bandages to be applied afterwards. If you can rest the horse for a couple of days, give a mild dose of physic. For bullet wounds, applications of cold water, as with men, is the only cure. All gashes, or sword cuts, must be sewn up as quickly as possible. Officers going on detached duty away from any veterinary surgeon, ought to take a small supply of horse medicine with them, such as balls, and discutient and astringent powders. Hoof ointment, for brittle feet or sand cracks, is made of tar and train oil in equal parts. One part of this ointment with two of train oil is good for mange.

Shoeing.—It is much to be regretted that all officers in passing out of the Staff College, should not be obliged to learn how to shoe a horse. I strongly advise all who have an opportunity of learning, to avail themselves of it. A set of spare shoes, with nails, should be carried on service with every horse: these shoes should be especially made to fit each horse; and when a shoe is cast, not a moment should be lost in having it replaced. If obliged to do so yourself, use the least number of nails that will keep it on for the time, and in driving them in, incline them well outwards, feeling for the end along the crust of the hoof with the fingers of the left hand; if, after the first few taps of the hammer, you do not feel the point coming out, draw the nail, and try it at another hole. A great part of the art is, in pointing the nail, to give it a slight bend outwards.

The shoe to be beveled off, so as to leave a space, and prevent pressure on the sole. It is not to be grooved, or fullered, but simply punched, and the nails countersunk.

Calkin is only to be applied to the hind shoe, and is to be confined to the outside heel. The inside heel to be thickened in proportion.

The weight of the shoe to be from 12 to 15 ounces, according to the size of the horse.

As a general principle, horses are to be shod with not less than 6 nails in the fore and 7 in the hind shoe; and the shoe is not to be attached with less than 3 nails on either side.

In preparing the foot for the shoe, as little as possible should be pared out, and the operation should be confined to the removal of the exfoliating parts of the sole.

Both fore and hind shoes to be made with a single clip at the toes.

The same shoe, unless very little worn, is not to be removed and reapplied in consequence of a horse having been sick. No hot shoe, under any circumstance, to be tried on a horse's foot.

Every horse to be newly shod once in a month.

THE MULE comes next, and almost rivals the horse in usefulness for general military purposes. Their common load, including weight of pack-saddle, is from 200 to 250 lbs.; height varies from 13 to 16 hands. They will eat almost anything, and require less careful management than the horse: the mule from the male ass and the mare is the best; their voices take after the sire. The real value of the mule is felt most strongly in mountainous countries.

In Abyssinia the load was reduced to 100 lbs. (exclusive of the pack-saddle) owing to the steepness of the roads.

THE BULLOCK is admirable for slow draught, especially over rough roads, or through forests, or other places where there are no roads at all. They stand fire better than any other animals, and used to be employed extensively in India for draught in field batteries. They must not be hurried; their ordinary pace is from 2 to 2½ miles an hour; if used over hard roads, they require shoeing. They want but little care, and thrive well on poor food. They attain their prime at 6 years; age to be known by annular swellings on horns, allowing 3 years for the 1st ring, and 1 for each of the others. They are used in many parts of India as pack-animals, when they carry a load of 200 lbs.

CAMELS are used in the East from 3 to 16 years of age; about 7 ft. high (to top of hump), about 8 ft. long from nose to tail. Pace about 2 miles an hour, kept up steadily for the longest marches; load for work on service about 400 to 450 lbs. They thrive well upon leaves of trees, and can go without water longer than any other animal. During temporary halts the laden camel can kneel down and rest. They are admirably adapted for carrying long articles, such as scaling ladders, infantry, pontoons, &c. The camel is at home in the desert, and works well in the plains of India; it is unsuited for hilly countries. After rain in clay soil,

and over rocks and stony places, they split up and are consequently useless there. They are good for fording rivers that are deep but not rapid, and where (as is so common in India) the bottom of the ford is shifting sand, the passage of a number of camels over it renders it hard and firm. The camel used in India is a vicious brute. Average weight about 1170 lbs.

In Bengal the allowance of camels to a regiment is as follows with European troops: 1 for each sergeant's tent; 1 for every two Paul tents; 2 for every 3 privates' tents; 1 for every 7 men's bedding; 1 per troop or company for cooking utensils; 1 for every 2 arm chests; 6 for all hospital stores; 4 per troop or company for stores; 1 for veterinary stores (for mounted corps only); 1 for scales and weight; and half a camel for each regimental sergeant-major, Q.M. sergeant, and schoolmaster.

THE ELEPHANT is the king of beasts of burden, becoming fit for work at 20 years of age, and lasting well to 50 and even 60 years of age. The load for steady work varies from 15 to 20 cwt. exclusive of the pad; pace from 3 to 3½ miles an hour; when laden, can keep up well with infantry in their daily marches; full grown, his height is from 10 ft. to 11 ft.; is most tractable in disposition, is invaluable during marches in countries flooded by rain for extricating carts, guns, and waggons that have stuck in the mud. They are now used in India for the draught of guns in siege trains; before such guns are taken under fire it is necessary to have the elephants taken out and replaced by bullocks, as the former cannot be made to stand fire. The average weight of an elephant in India is about 6600 lbs. They are often used in hilly countries to carry mountain guns on their back. (See article on Bridges for further dimensions.)

The two great necessities in the way of food are bread and meat; armies taking the field now will carry with them steam or field ovens (according to the nature of the service) for baking. The steam oven (on a carriage) is easily drawn along roads by a pair of horses, and can be taken across country, wherever guns can pass, by four horses. It requires coke for heating, a fuel easily carried, with the extra advantage that a little goes a long way. These ovens will bake in each batch on an average 109 loaves of 3 lbs., or 2 field rations each. It may be estimated that 4 *batches* of bread will be turned out of one of them by fair tradesmen under ten hours. The weight of this oven is about 2 tons. A smaller size weighs 1 ton 2 cwt., and will bake a little over half the quantity that the larger one can. The field ovens (Aldershot pattern) are made of sheet iron: each weighs about 320 to 342 lbs. (according to the pattern), complete with their equipment of tins, &c., and can bake 100 rations (150 lbs.) at a time. On the Red River Expedition one of these ovens worked by two men turned out 470

loaves (of one ration, 1½ lb. each) in 12 hours; oven being in good working order and the weather fair.

Travelling Bakery Waggons are also now approved for the use of the Army Service Corps. The waggons are covered, and in them the bakers can knead and prepare the bread for the ovens; they are constructed to carry the necessary dough-troughs and baking implements.

Supplies of meat must be obtained as much as possible in the country. They will generally be driven to the front from the depôts where they are collected. At every stage proper arrangements should be made for their protection and food: unless this is done, the loss of animals will be very great before any drove reaches the army. On the march with a force, meat should be killed every evening as soon as the march is over, so that, as the animals are driven, no transport should be required for it.

Previous to a general action every exertion should be made to collect supplies for several days at some point within one day's easy march in rear of the army. Two days' rations should always be issued the evening before a battle; these arrangements will permit of all the transport being devoted to removing the wounded immediately that the action is over.

SUPPLIES OF FOOD. *Meat.*—An ox should not weigh less than 600 lbs.;* 800 lbs. may be taken as an average, but a very good one will weigh twice as much: a cow may be a few pounds lighter. A deduction of 50 per cent. to be allowed for skin, offal, head, &c., &c. To find the weight of animals, the formula is $(G \times \cdot 08)\ L \times 42 =$ weight in lbs.; G being the girth in feet, taken close behind the shoulder, L the length in feet, measured from the fore part of the shoulder-blade to the bone of the tail. A good sheep weighs from 60 to 100 lbs.; 70 lbs. may be assumed as an average: 45 per cent. to be allowed for offal.

A full-grown pig weighs from 100 to 250 lbs.; 25 per cent. only being allowed for offal.

'Animals should be inspected by a veterinary surgeon 24 hours before being killed.' When possible, the meat should be killed from 24 to 48 hours in temperate climates, and 10 or 12 hours in the tropics, previous to being cooked. All animals for food should be in good health; if no veterinary surgeon is at hand, disease may easily be detected by a heavy sluggish look about the eyes, a hot dry feeling about the nose, and by a hanging tongue. The coat is also rough and staring; with cows the teats are hot. All runnings from the nostrils are suspicious.

If there is any suspicion of the rot being in sheep, throw the animal on his back, and push open the eyelids; if it is free from this disease, the eye-

* *These weights do not apply to oxen, sheep, &c., that have been fattened for the butcher.*

ball will be finely streaked with veins of a good healthy and bright red; if they are pale the sheep is diseased.

Meat, especially in hot countries, should always be inspected immediately before it is cooked. The lean and the fat should be in proportion—the latter should be firm, and not too yellow; the meat should not be bloody anywhere. When any doubt exists as to its condition, a doctor should examine it at once.

Salt Meat.—To inspect it have several casks opened; if not full of brine the meat is to be suspected, as any portion of meat not continually covered by it is sure to become bad. Examine portions from both ends and centre of cask; they should be of good colour, well provided with fat. Decomposition can be detected by the smell, by a greenish colour, and by an unnatural softness. When time permits, no salt meat should be accepted in large quantities as good without boiling and tasting pieces at hazard out of several barrels. This is more particularly the case in inspecting salt meat for a voyage.

Care should be taken to keep the casks always full of brine. Fresh brine is made by dissolving salt in water. Brine is considered sufficiently strong when a potato will float in it. Salt ceases to dissolve in the liquid when the latter is completely saturated.

Bread.—'There should be a due proportion, not less than 30 per cent., of crust; the exterior surface should be well baked, not burnt; the crumb should be permeated with small regular cavities, no parts should be heavy and without these little cells; the colour should be white, or brownish from a mixture of bran; the taste not acid, even when held in the mouth.' It will keep good for 4 or 5 days in warm, and for 7 or 8 days in cold weather. 30 per cent. is gained in weight in baking.

Flour should be white, with only a small amount of bran in it; there should be no lumps, or if any they should break easily on slight pressure: it must not be acid in taste, and there should be no smell of fermentation or mouldiness.* Barrels of flour when stored in houses should occasionally be rolled out into the open air. It was found on the Red River Expedition that flour kept in barrels is not injured in any large quantity when exposed to wet, as a caking of paste forms round it immediately inside the wood of the barrel which preserves the flour within it. The Hudson Bay Company keep flour during their great inland journeys in sacks which they soak in water previous to filling with flour, and a caking of paste is thus formed which keeps the flour sweet within it.

'*Biscuit* should be well baked, but not burnt; of a light yellow colour,

* For further information on these subjects, consult Dr. Parkes' 'Practical Hygiene.'

Food is generally sent to an army in the field in the following packages :

Nature of Ration.	How Packed.	Size of Package in Feet and Inches.	Cubic Measurement for Freight in Cubic Ft.	Average Weight in lbs.	
				Gross.	Net.
Biscuit . .	*Bags*	. .	5	102	100
„ . .	*Barrels*	2′ 6″ × 1′ 8·36″	7·214	106	84
Salt beef . .	Tierces	2′ 8″ × 2′ 2″	12·5185	530	300
„ . .	*Barrels*	2′ 4″ × 1′ 11″	8·5138	360	200
„ . .	Small casks . . .	1′ 7″ × 2′ 0″	6·336	202	100
Salt pork .	(Same as Salt Beef)				
„ . .	*and in barrels* . .	2′ 5·5″ × 1′ 9·3″	7·745	325	200
„ . .	Half	1′ 11″ × 1′ 6″	4·3	190	100
Flour . .	*Barrels*	2′ 6″ × 1′ 8·36″	7·214	219	196
„ . .	Half „	2′ 0″ × 1′ 4·545″	3·8	113	98
Sugar . .	*Barrels*	2′ 8″ × 2′ 2″	12·5185	460	390
„ . .	Half „	2′ 4″ × 1′ 11″	8·5138	339	280
„ . .	Kilderkins	2′ 3″ × 1′ 8″	6·25	228	180
„ . .	Small casks . . .	2′ 0″ × 1′ 7″	5	140	110
„ . .	Barrels	2′ 1″ × 1′ 6·45″	4·93	127	102
„ . .	„	1′ 11″ × 1′ 4·227″	3·49	94	79
Raw coffee .	„	2′ 8″ × 2′ 2″	12 5184	334	280
Ground „	*In cases made up of 20 lb. packages*	3′ 1″ × 1′ 4″ × 0′ 11″	3·7685	133	100
„ „ .	Small cases . . .	2′ 2·5″ × 1′ 4″ × 0′ 8·5″	2	73	50
Rice . . .	*Barrels*	2′ 8″ × 2′ 2″	12·5185	411	340
„ . . .	Half hogsheads . .	2′ 4″ × 1′ 11″	8·5138	309	250
„ . . .	Kilderkins . . .	2′ 3″ × 1′ 8″	6·25	218	170
„ . . .	Small casks . . .	2′ 0″ × 1′ 7″	5	130	100
„ . . .	„	1′ 7″ × 1′ 3″	2·473	67	50
Rum . . .	9½ *gallon cask* . .	2′ 3″ × 1′ 3″	3 515	119	89
Tea . . .	*Chests*	1′ 11″ × 1′ 9″ × 1′ 6″	5	112 to 136	90 to 110
„ . . .	Half chests . . .	1′ 10″ × 1′ 5″ × 1′ 2″	3	66	45 to 50
„ . . .	Catties	1′ 3″ × 1′ 0″ × 0′ 11″	1·145	28	21
Pepper .	*Cases holding 20 lb. canisters* . .	3′ 1″ × 1′ 4″ × 0′ 11″	3·7685	133	100
„ . .	Small cases . . .	1′ 7″ × 1′ 3″ × 1′ 0″	2	73	50
Salt . . .	*Bags*	. .	3·3	202	200
„ . . .	*Kegs*	1′ 6″ × 1′ 4·227″	2·7	115	110
Preserved potatoes	*Cases*	1′ 9″ × 1′ 4″ × 0′ 11″	2·1388	79	56
Lime juice .	Cases, 20 pints . .	1′ 7″ × 1′ 3″ × 1′ 0″	1·979	69	..

and should float in water. When struck, it should give a ringing sound; a piece put into the mouth should thoroughly soften down. It should be free from weevils.'

Tea and *Coffee* can only be judged of by tasting them when prepared for use in soft water. Tea should not be bitter; it should have an aromatic smell. Coffee should always be served out roasted and ground (not too fine). It should be sent from England soldered up in 10 lb. tins.

Sugar should be tolerably 'white,' crystalline, not evidently moist to the touch, and should dissolve entirely in water, or leave merely small fragments, which, on examination with the microscope, will be found to be bits of cane.

TABLE FOR CALCULATING THE NUMBER OF BARRELS OR OTHER CASES IN WHICH ANY GIVEN NUMBER OF RATIONS ARE CONTAINED, WITH THE BULK, GROSS WEIGHT, &c.

NATURE OF RATION.	Daily Allowance.	1000 Rations Net Weight in lbs.	No of Barrels &c., &c., containing 1000 Rations.	Gross Weight in lbs. of 1000 Rations.	Cubic Measurement in Feet of 1000 Rations (gross).
Biscuit in bags . . .	1 lb.	1000	10	1020	50
„ barrels .	1 „	1000	11·90476	1261·9	85·88
Salt beef in barrels . .	1 „	1000	5	1800	42·569
Salt pork „ . .	1 „	1000	5	1625	38·725
Flour „ . .	1 „	1000	5·102	1117·347	36·8
Sugar „ . .	2 oz.	125	0·3205	179·487	4·0
Raw coffee „ . .	$\frac{1}{3}$ „	20·833	0·07439	24·8468	0·93142
Ground coffee in cases .	$\frac{1}{3}$ „	20·833	0·20833	27·70789	0·78509
Rice in barrels . . .	1 „	62·5	0·19264	75·5514	0·767
Rum „ . . .	$\frac{1}{2}$ gill	146·44	1·64473	195·74	5·78
Tea in chests . . .	$\frac{1}{6}$ oz.	10·4162	0·1111	12·74	0·637
Pepper in cases . . .	$\frac{1}{36}$ „	1·736	0·0185	2·3	0·06542
Salt in bags	$\frac{1}{2}$ „	31·25	0·15625	31·5625	0·515625
„ kegs	$\frac{1}{2}$ „	31·25	0·284	32·67	0·7663
Preserved potatoes . .	4 „	250	4·4564	352·678	9·5482

The packages upon which this calculation is based are those printed in italics in previous Table. 1000 field rations (see page 53) will therefore weigh 3075 lbs. gross, and occupy 100 cubic feet, the biscuit being in bags.

Salt should be white, crystalline, and dry; it should dissolve completely in water.

Water.—In calculating the quantity of water required per man for drinking and cooking, it may be put down at 6 pints in temperate, and 8 pints in tropical climates. A similar amount will just allow men to wash their bodies. In stationary camps, however, the minimum daily allowance per man should be 5 gallons for all purposes, washing clothes included. Horses not doing work will thrive well on 6 gallons a day, but require from 8 to 12 when at work, according to their condition and the nature of the work. A couple of gallons extra should, under all circumstances, be allowed for washing them. Oxen require about 6 or 7 gallons daily.

In selecting positions, particularly those that are likely to be of a permanent character, a careful analysis of the water should be made by a medical man. A fair opinion can be formed as to whether it is wholesome or not, by the appearance of the inhabitants, and by tasting the water oneself. 'It should be transparent, colourless, without odour, and tasteless; well aërated, cool, and pleasant to drink; it must have no deposit; vegetables should be easily cooked in it.' Shallow well-water is always to be examined with suspicion. The water of some rivers at certain seasons is thick and muddy; in some, it is always so. To examine it without the aid of chemical tests, fill a long tumbler or other glass vessel with it. If the water has been drawn in a bucket or other vessel, shake it up and stir it well before pouring it into the tumbler or glass cylinder; let it stand for a day, or as many hours as possible; draw off the water without disturbing the sediment, which should then be carefully examined through the microscope of your telescope. Vegetable decompositions and iron are the chief substances that give colour to water. When water is very bad it should be boiled before drinking; after boiling it should be placed in shallow vessels, and poured from a height from one into another.

The dirtiest water I ever saw in common use was that of the Pei-Ho, which was of a deep yellowish-brown when drawn from the river, owing to the large amount of clay it held in suspension. It was cleaned, and made most palatable by immersing the hand containing a lump of allum in it, and moving it about for a few seconds. All the colouring matter sank to the bottom. The longer the time that elapses between the operation and drinking, the better. I do not think it has been proved that growing vegetable substances are always injurious, although dead vegetable matter is so without doubt.

Hay.—If possible, obtain that of last year's saving; hay cut in the summer is not good until about October 1. It should smell sweet, be free from weeds and dirt. A load is 36 trusses of 56 lbs. of old, or 60 lbs. of new, each. It is shipped for use during voyages, and sent to armies wanting

forage in compressed trusses bound with iron hoops, weighing from 140 to 160 lbs., and containing about 16 cubic feet. An acre of meadow-land, according to its quality, gives from 1 to 3 tons. It is considered new for 3 months. A cubic yard of old weighs 126 lbs., of new 84 lbs.; if well pressed, old hay weighs as much as 225 lbs. to the cubic yard. In inspecting hay, thrust the arm into it, and its age may be tolerably estimated by the ease or difficulty in doing so, for the newer it is, the easier is the arm thrust into it.

Straw should be sweet, clean, and unbroken—the longer it is the better; that which has been threshed by machinery is never nearly so good as that threshed by hand. A load is 36 trusses of 36 lbs. each; a cubic yard well pressed, weighs about 145 lbs. The weight of straw per acre of the following crops is, wheat, 3000 to 3600 lbs.; barley, 1500 to 2100 lbs.; oats, 2700 to 3500 lbs.; rye, 4000 to 4800 lbs.; bean-straw, 2700 to 3200 lbs.; pea-straw, 2700 lbs.

Oats, barley, and other grains should be free from dirt, well dried, without any approach to mouldiness; they should have a sweet smell, and be heavy in the grain, and free from insects. All grain kept in store in large quantities should be turned over at least twice a week, to prevent fermentation. A bushel of oats weighs from 24 to 42 lbs. (according to contract in England 38 lbs. to the bushel); of barley, 47 to 54 lbs.; of wheat, 60 lbs.; of rye, 54 lbs.; of maize (Indian corn), 56 to 66 lbs.; buck-wheat, 46 to 52 lbs.; beans, 60 to 64 lbs.; peas, 66 lbs.; potatoes, 60 lbs.; onions, 57 lbs.; 32 lbs. of oats, and 48 lbs. of wheat go to the cubic foot. Grain should be about a year old.

Crops.—The following number of bushels go to an acre: oats, 40 to 50; barley, 35 to 40; wheat, rye, and beans, 25 to 30; maize and buckwheat, 30; peas, 25; potatoes, 8 tons; turnips (white), 30 to 40 tons; (yellow), 30 to 32; (swedes), 28 to 34 tons; cabbage, 35 to 40 tons; carrots, 10 to 20 tons.

It is frequently difficult to obtain bushel measures in foreign countries: to make them, see "WEIGHTS AND MEASURES," *post.*

STORE SHIPS.—The system of placing the ships employed by the commissariat for stores and provision under naval control, is most injurious to the public interests, occasioning delays and difficulties which the good sense of those employed in both services can alone prevent proving fatal at times to the safety of the army. It is bad enough that the sea transport of the soldier should be entirely subject to Admiralty control, but that only entails difficulties on General and staff-officers and discomfort on the men; but to allow the navy to interfere with the store vessels may be ruin to the undertaking in hand. It would be well to attach a naval agent chosen from the rank of masters, to the C. of the S., who should act under his

orders, to be his adviser on all matters connected with shipping; he should have a ship-carpenter of experience to assist him in examining vessels previous to hiring them. The experience gained in our wars in the Crimea, in China, and in New Zealand, all goes to prove the necessity for this, yet the Admiralty party at home is still sufficiently strong to override it. Surely the army should be the best judge of what it requires, and military officers of experience are unanimous on this point. In loading ships with provisions for the use of an army about to land in an enemy's country, each should be loaded with as many complete rations as she will hold, instead of putting all the biscuit into one, all the meat into another, and so on, as is sometimes done. A minute list to be made of everything on board, the place where each is stowed away being noted on it: the Master to have a copy in his possession.

MAGAZINES.—Being an insular country, our base of supplies must be the sea. Our principal magazines must, therefore, be established on the coast, where there is a capacious harbour: this is the first consideration; the next is the means of inland conveyance from thence. A port at the mouth of a navigable river, whose course is parallel with the main line of communication and close to it, should, if possible, be selected; lines of rails running in the same direction, are next in advantage to rivers, and good paved or macadamised roads come next. Whatever may be the position chosen, it should be safe from attack. In disposing of the sea frontage or wharfage of the harbour, the largest and best portion of it should be appropriated for the landing and storing of provisions, and no naval officer of any rank should have power over it. Whilst the chief magazines are on the coast, other smaller ones must be established, at various distances, along the line of communication. If possible, they should only be three or four marches apart, and each should contain provisions for the army for the same number of days, so that, if forced to retreat, the magazines at each place would be cleared out according as the army fell back. The positions for these magazines must be selected by the Q.M.G., who will arrange with the controller as to the amount of stores to be kept at each, and the lines of communication, whether by water, railroad, or road, that are to be made use of in transporting provisions, the Q.M.G. stating particulars as to the relative safety of each; when both land and water communication is to be had, the former should be used for stores.

With us the system is to pay for everything. It renders the duties of the commissaries comparatively light, for if there are supplies in the country, of course money will bring them out; it is, however, a very expensive method of carrying on war. When campaigning in an enemy's country, it should without doubt be put under requisitions of money. In doing so, it is best to get them collected by the regular tax collectors of

the country acting under the local authorities; it will be for the General commanding to decide upon the extent to which the several districts shall be taxed. In making requisitions upon a country for provisions, the common practice has been to make them at the rate of 1 ration daily for every 3 inhabitants in a well cultivated district, or half that quantity in a mountainous or poorly cultivated one. It must be an understood thing that all purchases of every description, no matter by what department the stores may be required, shall be made by the department responsible for food and transport; it is disastrous to have two sets of people in the market, as, for instance, to have one purchasing horses for the cavalry and the other for the military train, each, of course, bidding against the other. All officers responsible for supplies should make themselves acquainted with the resources of the country in cattle, grain, forage, fuel, &c., and with the means of transport by land and water. An intimate knowledge of the line of communication by land and water is indispensable for the officer in charge of transport and supplies.

RATIONS. *Provisions.*—All officers and other soldiers when in the field draw the following rations daily: $1\frac{1}{2}$ lb. of bread or 1 lb. of biscuit, fresh or salt meat 1 lb., coffee $\frac{1}{3}$ oz., tea $\frac{1}{6}$ oz., sugar 2 oz., salt $\frac{1}{2}$ oz., pepper $\frac{1}{36}$ oz. When troops are marching or doing hard work, $\frac{1}{2}$ lb. more should be added to the meat ration.

The ration issued during the Autumn Manœuvres has been $1\frac{1}{4}$ lb. bread, or 1 lb. biscuit, 1 lb. fresh meat or salt pork, $\frac{1}{3}$ oz. of tea, 2 oz. sugar, $\frac{1}{2}$ oz. of salt, and $\frac{1}{36}$ oz. of pepper: $\frac{1}{4}$ lb. of cheese was occasionally added. This grocery ration is a great improvement upon the old plan of issuing a proportion of both tea and coffee upon the same day, as tea does not taste well when prepared in a pot in which coffee had been made a few hours before.

The ration issued latterly in the Crimea included, in addition to the above, $\frac{1}{2}$ lb. vegetables, 1 oz. of rice, and 1 oz. of lime juice; $\frac{1}{2}$ a gill of rum was also issued daily to every man, and extra issues of it were made upon the slightest excuses, so that at the end of the war every man who survived was a confirmed dram-drinker.

The rations issued in Abyssinia when transport had become most difficult were for Europeans, 1 lb. of biscuit or flour, 2 oz. of vegetables, $1\frac{1}{2}$ oz. of sugar, $\frac{1}{2}$ oz. of tea, and 1 dram of rum. For Indian soldiers, they were 1 lb. of flour, 2 oz. of ghee, if purchased locally; $\frac{1}{2}$ oz. of salt, and 2 oz. of vegetables once a week.

The daily ration for our men in Bengal consists of 1 lb. of bread, 1 lb. of beef or mutton, 1 lb. of potatoes or other equivalent vegetables, 4 oz. of rice, $\frac{2}{3}$ oz. of salt, $\frac{5}{7}$ oz. of tea, $1\frac{3}{7}$ oz. of coffee, and $2\frac{1}{2}$ oz. of sugar.

The rations issued during the Red River Expedition were, 1 lb. of salt pork, or $1\frac{1}{2}$ lb. of fresh meat, 1 lb. of biscuit, or $1\frac{1}{2}$ lb. of fresh bread, $\frac{1}{2}$ pint

of white beans, or $\frac{1}{4}$ lb. of preserved potatoes, 1 oz. of tea, 2 oz. of sugar, $\frac{1}{2}$ oz. of salt when fresh meat was issued, and $\frac{1}{36}$ oz. of pepper. Upon this ration the men did the hardest work I have ever known troops called upon to perform, and no force in the field could have been healthier.

The ration issued during the Ashantee War to white troops was, bread, $1\frac{1}{2}$ lb. fresh, or $1\frac{1}{4}$ lb. biscuit, or 1 lb. of flour; meat, $1\frac{1}{2}$ lb. fresh or salt, or 1 lb. preserved; vegetables, 2 oz., rice or peas, or 4 oz. of preserved potatoes, or 1 lb. of fresh; tea, $\frac{3}{4}$ oz.; sugar, 3 oz.; salt, $\frac{1}{2}$ oz. pepper, $\frac{1}{36}$ oz. On days when long marches were made, or when an engagement was anticipated, 4 oz. of sausage.

The native levies not being Fantees, received $1\frac{1}{4}$ lb. of rice, or 1 lb. of biscuit; $\frac{1}{2}$ lb. of salt meat, or 6 oz. of preserved potatoes. The native carriers received $1\frac{1}{4}$ lb. of rice. The native allies (Fantees) received 1 pint of rice and $\frac{1}{4}$ lb. of salt meat. This ration for white troops was the largest ever given; the exhausting nature of the climate, rendered it necessary to give the men as much as they could possibly eat and digest.

Whenever it is practicable to do so, rations should be issued direct to the soldier in quantities to last two or three days. It teaches him to economise his food, so that when it becomes necessary, as it frequently does in war, to give him several days' supply at a time, it may not be a new thing for him to exercise discretion and care in using them properly.

C.O.s in our army do the reverse invariably. When giving several days' rations for their men they keep it in bulk, if possible, and issue it in small quantities, telling you that if they gave it out to their men at once, they would eat it all in one day, or throw away what they could not eat after their first meal. This is the old story of treating our men as foolish children. Let us in future endeavour to teach them to reflect, and act as they would in civil life regarding their food.

Fuel, per man per day, is 3 lbs. of firewood or coal. When the latter is issued, 1 lb. of kindling wood is allowed to every 36 lbs. of coal. In the Crimea the allowance of fuel was increased latterly to $4\frac{1}{2}$ lbs. of wood. This is only intended for cooking. The nature of the climate, and the nature of the huts or temporary barracks, must determine the amount required for heating purposes. As a rule, whilst an army is campaigning in a country where wood is plentiful, no issues of fuel for cooking will be made by the Commissariat; the troops will provide themselves with wood every day when they halt, parties, each under an officer, being sent to cut it.

Straw for bedding will be issued when troops are halted for any length of time, at the rate of 72 lbs. per 5 men, or 216 lbs. per bell tent, to be refreshed with half the quantity at the end of succeeding 8 days, until the 24th day, when an entirely fresh issue is to be made. In wet weather it

must be changed more frequently. See "INTERNAL ARRANGEMENT OF CAMPS," *post.*

Forage.—The daily ration for all chargers and horses is 12 lbs. of oats and 12 lbs. of hay: for pack animals 8 lbs. of oats and 10 lbs. of hay. Horses employed on heavy draught work are allowed 2 lbs. of oats and 2 lbs. of hay extra. The ration in the Crimea for the former was 12 lbs. of oats or barley, and 16 lbs. of hay or chopped straw. Latterly, 1 lb. of bran was issued in addition, for all horses, and 1 lb. of bran was always substituted for a similar amount of grain when required. The allowance of oats for the artillery was afterwards increased to 14 lbs. In Turkey, where green forage was issued, 28 lbs. were given in lieu of 10 lbs. of hay or chopped straw. When no grain is to be had, the ration of hay should be 32 lbs. 14 lbs. of bran = 9 lbs. of oats. When horses are stabled, 8 lbs. of straw should be used per horse as bedding. Horses require from 6 to 8 gallons of water daily, according to the work they do and the climate they do it in.

In India, Arabs and small horses have 8 lbs., and colonial horses 10 lbs. of grain daily. The grass provided by the grass-cutter is about 30 lbs. per horse daily.

Mules in the Crimea were given 10 lbs. of barley and 12 lbs. of chopped straw.

Rations for bullocks that are used in India for draught in the siege train and artillery batteries are 4 to 6 lbs. of grain, and 14 lbs. of chopped straw.

Oxen in the Crimea received 6 lbs. of oil cake and 12 lbs. of chopped straw; or in the absence of oil cake, 6 lbs. of barley.

For Buffaloes in the Crimea the ration was hay or straw 20 lbs., 15 lbs. oats or 12 lbs. of barley, and 15 lbs. of bran, increased to 30 lbs. when no hay or straw was issued.

For Camels in the Crimea the ration was 9 lbs. of barley-meal, and 12 lbs. chopped straw. When the latter could not be had, 9 lbs. of barley was issued instead. They ought to have green food, if possible. In India they are fed entirely upon the leaves of trees; those of the peepul are the best.

Elephants in India are given from 15 to 30 lbs. of wheat flour, according to the size of the animal and the work he is doing. Mixed with it is 1 lb. of coarse sugar or molasses. This is given to him in large thick cakes, and from 80 to 100 lbs. of green food, such as sugar-cane, branches of the peepul and other trees, green corn, &c. If green food is not to be had, the same quantity of rice or other straw.

MONEY.—Its provision will, in future, be made by treasurers acting under the control department. The commissary of supplies with each

division should always, however, have a small supply of ready money (if possible, in the currency of the country) for the daily purchase of supplies. It should be carried in a waggon built expressly for the purpose. As stated under the head of Correspondence, all papers connected with accounts, whether of stores or cash, should be despatched weekly, or as often as necessary, to some depôt in rear, where there should be an account and credit department to compile, classify, and finally close all the accounts of the army. With us, usually, a long time elapses before accounts are audited; the consequence is, that for months, and in some instances for years after money has been paid away, queries are sent forward regarding them to officers, who have perhaps forgotten all about the circumstances. To force officers in the field to keep elaborate store accounts, is to prevent them from doing their duty to the army as well as they ought. The treasure for the army will of course be in charge of the treasurer, who will issue it in such quantities to the paymasters, commissaries of provisions, &c., as the controller may direct. Officers and others drawing pay, frequently require to remit money to their families at home: every facility should be afforded for doing so by the issue of drafts on the treasury at home. This plan, if well carried out, would reduce the amount of bullion to be sent from England to the seat of war. Sutlers with an army are only too glad to obtain the cheques of officers on their bankers at home in exchange for money which they have no means of keeping. How much more willingly would they accept orders on the treasury. If proper arrangements had been made in the Crimea, much of the money paid out from the treasury chest might have been returned to it in exchange for orders on the treasury at home.

THE SUPPLY OF HORSES AND OTHER TRANSPORT ANIMALS.—This is a question of great importance. As soon as a campaign opens, a large depôt should be formed somewhere along the line of communication, where forage is plentiful or easily obtainable—where animals of all sorts to replace casualties should be collected. In connection, but at some little distance from them (having, above all things, a separate watering place), there should be depôts for the reception of sick animals. The staff to work these depôts should be under the control department, the requisite number of grooms and labourers being obtained from the population, or sent from home (soldiers, under no circumstances, to be detached from their regiments for such purposes). If depôts of this nature are well organised and well worked, they will be of the greatest use, and will economise expenditure to an immense extent. Without them, an animal once really knocked up is lost for ever to the service.

The cavalry and artillery should each select their remounts from them. Demands for remounts should be sent once a week to the A.G., as also

requests for the return to these depôts of all animals temporarily unfit for service from lameness, sore backs, &c., &c.

Mounted officers requiring horses, to obtain them on payment in a similar manner.

STORES.—The controller is the channel through which all demands for the personal equipment of the troops are to pass.*

All demands are to contain full and exact details as to the number and particular description of every article required, according to the authorized nomenclature or vocabulary of stores, and to be made on the prescribed forms.

In the case of stores to be issued upon the authority of a G.O. according to the strength of the regiment, or in certain proportions (for instance, a second blanket per man, the further issue of a pair of boots, or of so many stoves per regiment), the requisition will be transmitted direct to the commissary of supply, no other authority being necessary beyond the G.O., the number and date of which must be quoted on the requisition.

Officers commanding corps when in the field will cause inspections to be made of all equipment after an action, as well as daily when halted after a march, in order that their condition may be constantly known and reported upon when necessary to the G.O.C.

They will immediately make requisitions, in duplicate, direct to the Deputy Controller of the division, for the replacement of any articles which may have been lost, or have become unserviceable either from fair wear or through the neglect of individuals.

When stores of any kind are lost, destroyed, or injured, and it is a matter of consideration on whom the expense of repairing or replacing should fall, the G.O.C. will assemble a court of inquiry, composed of officers not belonging to the corps interested if practicable, to investigate the matter.

Controllers, under the authority of the G.O.C., will arrange as to the mode and time of supply, acting in direct communication with the officers to whom the issues are to be made.

Camp Equipment includes all articles that are not personal equipment required by troops for themselves and horses in the field except food. It is distributed by companies or troops, and captains are responsible for it. All requisitions for it are made direct to the controller by the C.O.s of corps, and must be accompanied by a statement of the strength of the corps or detachment for which it is required giving the information as follows :—

* *Under the term 'personal equipment' will be included all small arms, accoutrements, small arm ammunition, harness, saddlery, and other appointments supplied for men and horses as well as tools and materials for their repair and preservation.*

Mounted Corps.	Number.	Dismounted Corps.	Number.
Batteries.		Batteries	
Troops		Companies	
Officers { Field		Officers { Field	
Officers { Other ranks. . . .		Officers { Other ranks	
Staff-sergeants		Staff-sergeants	
N.C.O.'s and men		N.C.O.'s and men	
Horses { Officers' chargers . .		Officers' chargers	
Horses { Troop (ridden as chargers by officers)		Public bât animals.	
Horses { Troop		Private bât animals	
Public bât animals.			
Private bât animals			

The quantity of each article demanded that may be in possession is also to be stated, specifying how many are serviceable and unserviceable, and the reasons for demanding them.

Any articles lost otherwise than by unavoidable accident, or damaged beyond what may be considered as fair wear and tear, will be charged against the troops.

All articles may be purchased by officers when in the field, provided the state of the store admits of the sale.

It is the writer's conviction that tents cannot possibly be carried by an army when engaged in active operations before an enemy. The Prussians during their late wars had none, neither had our army in the Peninsula. As the lines of operation will generally be along railways, tents can easily be brought up for use when the army is stationary for any length of time as at a siege. At other times the men must bivouac and be billeted in villages.

The authorized quantities of camp equipment for cavalry and infantry have been already detailed in the organisation of those arms. The artillery and engineer train have theirs always in possession.

The Circular Tent is the one used in our army (except in India). It is issued at the rate of 1 to every 15 men;* it is 10 ft. high, diam. at base is 12·5 ft., the ropes extend about 18 in. all round: its apex forms an angle of 70°; it weighs 74 lbs. complete with pole when dry; it is made of canvas.

* *In Abyssinia, when transport became very difficult, these tents were issued at the rate of* 1 *to every* 20 *men,* 1 *to each brigadier and his staff, and* 1 *to every* 12 *other officers.*

(All canvas tents increase in weight by from 30 to 40 per cent. when completely wet.) It consists of 1 valise, 1 pole (in 2 pieces), and a bag containing 42 pins and 2 mallets.

The Tent d'Abri consists of two sheets, 2 poles, and 7 pins, and weighs about 11 lbs. when dry; it is issued at the rate of 1 to every 3 men, when supplied.

The Hospital Marquee complete weighs, when dry, 512 lbs., and consists of 1 valise, 1 bundle of poles, 1 bag containing 4 large and 180 small pins, and 2 mallets, and 1 bottom. It is intended for the accommodation of 18 sick, and contains 3·336 cubic feet of air.

In Bengal tents are issued to European troops as follows: 1 staff sergeants' tent to each of the following—regimental sergeant-major, quartermaster sergeant, musketry sergeant, paymaster sergeant, orderly-room clerk, band-master, armourer-sergeant. Privates' tents, 1 to every 16 men; 1 for rear and 1 for quarter-guard. The officers provided their own tents.

A staff sergeants' tent weighs 400 lbs. when dry. A privates' tent, when dry, weighs 600 lbs. A Lascar pal weighs 248 lbs.

In Bombay the privates' tent holds 22 men; in Madras, 25 men.

NOTE.—*A hand hatchet weighs* 1 *lb.* 14 *oz.; a felling axe (Canada pattern),* 4 *lbs.* 8 *oz., with handle; a pick-axe,* 5 *lbs., with handle; a shovel,* 4 *lbs.* 12 *oz.; a spade,* 6 *lbs.; a bell tent, dry,* 74 *lbs., and when wet about* 90 *lbs.; a blanket, old pattern,* 3 *lbs.* 12 *oz.; new pattern,* 4 *lbs.* 10 *oz.* (7½ *ft.* × 5 *ft. in size). The flanders camp kettle* 3½ *lbs. (holds* 12 *quarts,* 12 *in. in breadth at top, and* 11 *in. at bottom, depth* 12 *in., and cooks for* 8 *men); the Torrens kettle weighs* 3½ *lbs. (holds* 6 *quarts, and cooks for* 5 *men). Reaping hook,* 10 *oz.; sickle,* 14 *oz; horse blankets,* 6¼ *lbs.; billhook,* 1 *lb.* 12 *oz.*

AMMUNITION.—The A.G. of an army in the field is responsible to the G.O. commanding for the supply of ammunition for that army.

To enable him to perform this duty efficiently, he will be furnished as often as he may deem necessary, by the Officer commanding the R.A. and the Controller, with returns of the reserves in R.A. and Control charge respectively.

General Officers commanding Divisions are responsible for maintaining their reserves of ammunition, and they will be furnished as often as may be required with the necessary reports from the Officer commanding the R.A. of the division. Any deficiency in the regulated amount of ammunition is to be immediately made known to the A.G. of the army.

As a general rule, subject to such modifications as the nature of the service may require, the proportion of gun ammunition is calculated at 500 rounds per gun, and of ammunition for small arms at 480 rounds per man. These proportions will usually be distributed in the following manner, subject to the approval of the G.O. Commanding:—

—	Rounds of Ammunition.		
	Per Gun.		Small Arms, per Man.
	9-pr.	16-pr.	
In possession of the Troops.	148	100	70 } 100
Regimental Reserve			30
Field Reserves with the Artillery . . . . 1st Reserve . . .	108	72	40 } 80
2nd Reserve . . .	44	108	40
	300	280	180
Military Store Reserves, Grand Depôt and Intermediate Reserves	200	300	300
	500	480	480

The *Regimental Reserve* of 30 rounds per man (in addition to the 70 rounds in possession of the troops) will accompany each battalion in the field in charge of the officer commanding, to move with the battalion, and be kept supplied by demands on the *First Divisional Reserve in charge of the Artillery.*

The Transport of the Regimental Reserve for a battalion of 1000 men (24,000 rounds) will require:—

—	Men.	Animals.	Weight of Ammunition.
3 small arm ammunition carts, each carrying 9,600 rounds of ammunition	3	6	..
1 Non-commissioned Officer	1	..	..

Making a total of four men and six animals.

Pack animals, however, will be exclusively employed, where, from the nature of the country, carts would not be available.

The load for a pack animal will be :—

2 boxes, weight, 78 lbs. each	156 lbs.	Total weight, 206 lbs., exclusive of forage.
Pack-saddle	34 „	
Cover	6 „	
Strappings and other articles	10 „	

For brigades and divisions, the G.O.C. will distribute his reserve ammunition transport, or mass it as he may think best; while for smaller bodies of troops, pack animals could accompany and supply one or more detached companies over any ground or on outpost duty.

The *first* divisional and *second* army corps reserves of gun and small-arm ammunition are to be in charge of the R.A., and will be conveyed and replenished as hereinafter directed.

The *third* reserve of gun and small-arm ammunition will be in the custody of the Control Department.

The first and second reserves will form part of the original equipments of the R.A., and will not be chargeable to the Control Officer.

The *first reserve* of ammunition for the guns (108 rounds per gun for 9-pr., and 72 per gun for 16-pr.) is that contained in the divisional reserve.

The first reserve for small-arms (about 40 rounds per man) will be conveyed in ammunition carts attached to the division at reserve. Should the state of the country in which the army is acting render it necessary to adopt any other method of transporting this reserve, the means by which it is to be accomplished are to be determined by the Commander of the Forces, and carried out by the R.A.

This first reserve is, under all circumstances, to be at hand, and in the event of its being found necessary to separate the carts from the divisional reserves to which they are attached, the Divisional C.O. of R.A. must make arrangements for their being placed under proper charge, in some safe spot, easily accessible to the troops, in order that no unnecessary delay may occur when occasion shall arise for making issues to corps whose supplies are exhausted.

The *second army corps reserve* of gun and small-arm ammnnition (at the rate of 44 rounds per gun for 9-pr., and 108 per gun for 16-pr., and 40 rounds per man) will be conveyed by the R.A., and is always to be kept up with the army, and as far as practicable out of fire.

The *first divisional and second army corps reserves* are to be under the immediate orders of the Officers of R.A., who will be responsible to the officer commanding the Division or Army Corps that the ammunition of the first reserve is from time to time completed, so far as circumstances will permit, from the second reserve.

These two reserves are to be completed from the third reserve in charge of the Control Department, upon requisitions of the Officer commanding the R.A., supported by the receipts for the issues made to the troops. On emergency, however, the Control Officers are to make issues on requisitions from Officers commanding the R.A. reserves, but such issues will be reported by the Commissary in charge of the Depôt to the Controller at head-quarters for covering approval.

The *third reserve*, viz., 200 rounds per gun for 9-pr., and 200 per gun for 16-pr., and 300 rounds per man, in charge of the Control Department, should be placed in a depôt or depôts.

Should the base of operations, where the grand depôt of reserve is placed, be further distant than an ordinary two days' march from the reserves last mentioned, intermediate

reserves will be required; upon the organisation and disposition of which the A.G. of the army in the field and the Controller should take the orders of the G.O.C., who will determine what course should be followed to insure a regular and sufficient supply of ammunition from the grand depôt of reserve, for the use of the army.

Officers commanding corps in the field will obtain their supplies of ammunition on requisitions direct from the Officers commanding the Artillery reserves.

Gun Ammunition is carried by field artillery thus: 2 rounds on gun-carriage, 30 rounds on gun-limber, 30 rounds on waggon-limber, and 60 rounds on waggon body. A battery with one line of waggons has consequently 122 rounds a gun, or with two lines of waggons it has 212 rounds a gun.

Gunpowder is packed in barrels and half-barrels: the former contain 100 lbs., and weigh 30 lbs. each; their height is 21·5 in., their circumference at bung 55·75 in., taking up 2·5 cubic feet of magazine space; the latter contain 50 lbs. and weigh 18 lbs. each; their height is 17 in., their circumference at bung 42·5 in., and they take up 1·4 cubic foot of magazine space. Powder is always sent abroad in lots of 100 barrels at a time. A cubic foot of powder weighs about 56 lbs.

Snider Ammunition is packed in boxes 7 in. wide, 8·5 in. deep, 16 in. long, containing 500 rounds each, weighing 64 lbs., and taking up 0·55 cubic in. of magazine space. A new pattern S.A.A. waggon carries 39 of these boxes (24 in body, and 15 in limber); an old pattern waggon carries the same number, but has 27 in body and 12 in limber. There is a new pattern box, holding 560 rounds, 21·8 in. long, 7 in. wide, and 8·6 in. deep; it weighs, when empty, 12 lbs. 1·5 oz., and when full, 72 lbs. 8 oz. 16 of these new pattern boxes fit into the new S.A.A. cart, and 32 of them into the new pattern S.A.A. waggon.

Henry-Martini Ammunition is packed in boxes measuring 21·75 in. × 8·5 in. × 7 in., weighing, when empty, 12 lbs. 1·5 oz., and when full, 79 lbs. 8 oz. It holds 600 rounds; a S.A.A. waggon carries 32 of these boxes (20 in body and 12 in limber); a S.A.A. cart carries 16 of these boxes, in 8 partitions of 2 each.

A S.A.A. cart weighs 8 cwt. 2 qrs. 10 lbs. unloaded, and 19 cwt. 3 qrs. 13 lbs. when loaded.

CLOTHING AND NECESSARIES.—All correspondence connected therewith goes, during peace, direct to the Director of Clothing in London; but in the field, all such must be obtained by requisitions upon the Control Department.

MARKS FOR STORES.—The following is the method of marking stores and packages sent to an army in the field, in order to facilitate their collection, arrangement, and delivery:—

Mark.	Class of Stores.
Balls { one blue ball	Ordnance carriages, shot of all kinds, empty shells, and general stores *for field service.*
Balls { two "	Similar articles *for siege service.*
Balls { one red ball	Small arms, accoutrements, and the implements or materials for their repair.
Crosses { one red cross	Medicines and medical instruments.
Crosses { one black cross	Medical comforts.
Crosses { two "	Hospital and barrack stores.
Diamonds (two red diamonds) . . .	Ammunition for artillery or small arms, including live shells and combustible stores.
Heart (one black heart)	Clothing and necessaries.
Horse-shoes { one black horse-shoe . .	Harness and saddlery; pack-saddles included.
Horse-shoes { two " . .	Waggons and carts for transport of stores.
Squares { one black square	Intrenching tools, nails, &c.
Squares { two "	Materials for hutting or building (except nails).
Triangles { one red triangle	Miscellaneous stores.
Triangles { two black triangles . . .	Camp equipage (except intrenching tools and pack-saddles).
Trefoil (one green trefoil or club) . .	Food, forage, fuel, and light.

The Medical Department.—The P.M.O. with an army in the field is generally an *Inspector-general of Hospitals*, who has a medical officer to assist him as field inspector. All arrangements for care, treatment, and conveyance of sick and wounded, are made by the P.M.O., through the chief of the staff, or Q.M.G. He will bring to the notice of the Commander all circumstances affecting the health of the men, and recommend any changes he may consider necessary in their rations. It is advisable that the earliest information regarding intended movements may be given to the P.M.O., so that due arrangements may be made for the establishment of the necessary hospitals, &c., &c.

The medical staff with each Army Corps is to be, 1 I. G. of H. as P.M.O.; 1 I. G. of H. as sanitary officer; 1 selected M.O. to act as a Field Hospital director; 1 staff surgeon to act as secretary to P.M.O.; 1 staff surgeon as pathologist; 1 officer A.H.C. to be with Field Hospital director; 4 N.C.O. as clerks, and 6 orderlies, all these soldiers being of the A.H.C. If the army is to consist of several corps, to attach such a huge medical staff to each would be out of the question, for after all, the true province of doctors is to heal the sick.

The medical staff with each Division is to be, 1 D.I.G. of H. as P.M.O., 1 staff surgeon as secretary, 1 sergeant as clerk, and 1 orderly.

MEDICAL ARRANGEMENTS.—Our present system of regimental hospitals is unsuited for a large army: it is very expensive, and too cumbrous for rapid or constant moving. The sick and wounded with an army should be treated as follows. All slight cases of illness, such as diarrhœa, colds, bruises, &c., &c., should be treated by the surgeon attached to each battalion. All cases that require the patient to receive more careful treatment and diet than can be afforded to men in bell tents, without hospital appliances or equipment, should be sent to the field hospital, except cases of an infectious nature, such as typhus fever, small-pox, &c., which should be sent direct, and with the least possible delay, to some general hospital appointed especially for their reception. It will be for the medical officers in charge of field hospitals to decide what cases shall be retained there for treatment until fit to return to their duty, and which shall be sent to the general hospitals in the rear.

This system, recommended in the first edition, has now been authoritatively adopted, and the medical establishment with each Battalion, Regiment of Cavalry and Battery of Artillery in the field, is to be as follows: 1 surgeon, 1 pair of panniers on a mule or horse with a driver, and 1 orderly of A.H.C. The sick to be treated in Field Hospitals, the establishment of which is given on next page. All regimental transport for the conveyance of sick and wounded has been abolished.

With an army actively engaged in the field the proportion of sick and wounded to the strength of the force may be estimated thus:

Sick	10 per cent.
Wounded	16 „
Total	26 „

but it will only be necessary to provide hospital accommodation for

Sick constant daily average . . .	5 per cent.
Sick reserve	5 „
Wounded after a general action . .	5 „
Total	15 „

The grounds for this reduction in the estimate are as follows:—It is assumed that the constant daily average sick with the force will amount to 5 per cent., the wounded to 16 per cent. Half the former, being slight cases, might be disposed of, on the advent of a general action; one-fourth of the latter will not require to be retained in hospital; leaving $2\frac{1}{2} + 12 = 14\frac{1}{2}$ per cent. as the minimum hospital accommodation required.

In calculating the number of doctors required to take care of and attend upon any given number of patients, it may be put down at one doctor to every 40 sick or wounded.

In providing for the care of the sick and wounded of an army, it is advisable to avoid collecting more than about 500 of the former, or 250 of the latter, in any one spot, when such can be avoided; and when temporary buildings are erected for hospital purposes, they should be spread over as much space as possible without interfering too much with facility of administration. No one tent or building should have more than 20 beds. All the experience of late years proves that sick and wounded, particularly the latter, do much better under canvas than in buildings; it is, therefore, advisable that in establishing temporary hospitals for large numbers, one-fourth of the wounded should be provided for in tents, the other three-fourths in huts.

For a hospital so constituted, the number of attendants, including orderlies, nurses, cooks, &c., &c., can be estimated roughly at 2 per ward of 20, or per marquee of 15 sick.

Field Hospitals.—Two or three of them will be attached to each division.* Each is calculated for the accommodation of 200 patients, and is so organised as to be capable of division into two complete portions for 100 sick each. Three per division provide for its sick at the rate of about 5·75 per cent., provision being made in the general hospital in rear for sick, at the rate of about 4·25 per cent. of the division—that is, for 10 per cent. of the division in the two hospitals together.

Each Field Hospital will have 2 hospital surgery waggons and 4 hospital store waggons. The personnel of each Field Hospital will be:—

1 Medical Officer in Charge.
2 Surgeons Major or Senior Surgeons.
4 Surgeons.
1 Captain of Orderlies.

For Ward and Medical Duties.

2 Colour Sergeants	Wardmasters.
1 Colour Sergeant	Compounder in charge.
1 Sergeant	Compounder.
1 Sergeant	P.M. Officer's Clerk.
4 2nd Corporals	
18 Privates	Orderlies.

* The proportion of field hospitals to divisions, &c., has not yet been definitely settled.

For Administrative Duties.

1 Sergeant Major	Steward.
1 Colour Sergeant	Assistant Steward.
2 Sergeants	Clerks or Packstore Keepers.
2 Sergeants	Cooks.
4 Privates	Assistant Cooks.

No accumulation of sick should ever be allowed in them, and all men whose cases may become serious from time to time should be sent to the nearest general hospital in rear; in fact, all cases that are not likely to recover in a few days should be thus got rid of. In this way they will be prepared for emergencies. This is all the more essential when the force is moving, and particularly before an action. The evils likely to arise from the collection of large numbers of sick in camp will thus be avoided. Hospitals crowded with sick and wounded in an army have a depressing influence upon the spirits of soldiers, and they are millstones round a commander's neck, preventing rapid movements. Their position will, when on the move, be pointed out daily by the A.Q.M.G.

During an action, they should be established as near the front as possible, but in places screened from fire. In selecting their position, the A.Q.M.G. should on such occasions make use of any large houses or churches that may be near, as shelter is in bad weather of the first consequence. It is essential that there should be a good supply of water at hand. The site being selected, a large yellow flag, with the number of the division marked on it, should be hoisted in the most prominent position. Small yellow flags should be erected at every 400 or 500 yards from thence to the centre of the division, fastening them in trees or on houses, so as to be easily seen. If the division advances any distance, more flags will be added. This duty should be done by the ambulance men. Wounded men able to walk or crawl would thus be able to find their hospitals without the assistance of others. When there is no road or beaten path to guide them, it is advisable to erect rough finger-posts at the flags, to indicate the direction of the next one in rear. The flags should be numbered, No. 1 being nearest the hospital. Coloured lanterns might be made to answer the same purpose at night.

In action the surgeon attached to each battalion should not attempt to perform operations, but should merely take measures to save life, until the wounded men can be conveyed to the nearest field hospital.

Army Hospital Corps.—The men are employed in the care of the sick and wounded, in carrying out the directions of the medical officers with respect to diet and treatment, and in administering the medicines ordered. They act as stewards, cooks, bakers, &c., &c., and take charge of all hospital stores, clothing, bedding, and utensils. The corps is chiefly recruited from

the ranks of the army, to which a man can be sent back if he misbehaves himself.

General Hospitals.—Circumstances can alone determine their position and the numbers they are intended for. According as the army increases the distance between its base and itself, more general hospitals will be required; and when a general action is anticipated, large hospitals must be established at the distance of one or two days' journey, by rail or water, from the army. In determining their position, the nature of the communications between the base and the army must be first considered. The object and nature of the intended operations will also greatly influence the selection. When there is a choice between water and any other mode of conveyance, the former ought to be selected, and large roomy boats should be expressly prepared for moving the sick. These hospitals will either be established in some existing buildings, or in tents or huts built expressly for the purpose. Either of the two last are better than the former in a sanitary point of view. Churches, as a rule, are objectionable. Before any building is taken, the P.M.O., or the sanitary officer appointed by him, will accompany a Q.M.G. officer in inspecting it; its position and environs to be carefully studied, the drainage, both natural and artificial, to be examined, also the ventilation, water supply, &c. The sanitary considerations detailed hereafter, with reference to the selection of sites for camps and positions, apply still more forcibly with regard to hospitals. The number of patients that any building can accommodate is found by dividing the cubic contents in feet of each room by 1,200 in ordinary climates, and by 1,500 in the tropics. Rooms must be reserved for a surgery, kitchen, ablution purposes, steward, orderlies, &c., &c.

It is generally more economical, and always more desirable, to construct huts for stationary hospitals, than to convert existing buildings for the purpose. Six hundred cubic feet per patient is allowed in hospital huts.

As a general rule, accommodation will be required in General Hospitals at the rate of 1,400 beds for each Army Corps.

All general hospitals are to be organised under the following officers:—A military officer of rank as governor, a P.M.O., an apothecary or dispenser, a paymaster, a captain of orderlies, and a superintendent of nurses when nurses are employed.

The Governor, acting under the orders of the Commander of the army, is responsible in every way for the condition of the hospital, in which he is supreme, his decision on every question brought before him being final. He is to reside within the precincts of the hospital, and visit every part of it daily. He represents the S. of S. for War, and has power to authorize the purchase of all stores or equipments required, reporting the expenditure direct to the W.O.

The P.M.O. is responsible for the medical care and treatment of the sick. He will report to the governor all neglect on the part of subordinates, and make whatever suggestions he may consider necessary for increasing the comfort of the sick.

It is intended that the duties formerly performed by the purveyor's department, shall in future be done in all hospitals, by subordinates of the medical department.

The Paymaster pays all the establishment, and all patients up to the day of their leaving hospital inclusive. He makes disbursements in payment for all the purchases ordered by the governor, and keeps all the accounts of receipts and expenditure.

Grave-yards.—There must be one in the vicinity of each general hospital: it should not be within view from the hospital, nor within easy lounging distance of convalescents. The dead-house should be in a retired spot, so that funerals can take place without attracting attention. The French, who wisely study every trifle that may affect the morale of their soldiers, used to bury the dead from their large general hospitals in the Crimea before day-break in the morning. This should always be done when practicable. If on the sea-shore, the dead might be taken out daily a few miles and buried in the sea, as it is much better in a sanitary point of view than burial on shore; but care must be taken to prevent them rising to the surface, or being washed ashore; a circumstance that created such horror in our army in Egypt, in 1809, when some hundred of bodies that had been buried at sea were washed ashore. In all cemeteries the graves should be dug about 6 feet deep, and charcoal and lime should be freely used.

Convalescent Depôts should be established in connection with general hospitals. It is not necessary that there should be equal numbers of each, for one of such depôts may be made to receive the men discharged from several hospitals. Establishments of this nature are much open to abuse, and are, unless well looked after, merely places of refuge for skulkers of all ranks. They should be under the command of a military officer of standing, who should be carefully selected for this duty; he should be stern and determined, but just to all. Frequent inspections should be made of these places by general officers, who should carefully examine all men who have been more than a fortnight there, going minutely into their cases with the medical officer in charge. They should send in written confidential reports to the C. of the S. or A.G. upon all officers at such establishments, as it is advisable to force men to leave the service who are either physically unfit, or *imagine themselves so*, for the hard work of a campaign.

It must, however, be remembered, that the old saying of *a man being either in hospital or at his duty*, is absurd: a man may be so far recovered

that it is cruelty to keep him in the restraint of a hospital, although at the same time he is really unfit for work. To send him direct to his regiment is merely sending him back to the hospital by a roundabout way, whereas if he is sent to some healthy depôt, away from the depressing influence of a hospital, where he shall be well fed for a fortnight, he returns to his duty a new man, both in mind and body.

The distance of the theatre of war from England, and the probable duration of the campaign, must determine the nature of the cases that shall be sent to England and those that are to be sent to the convalescent depôts.

Conveyance of Sick and Wounded.—Hitherto it has been customary to provide for this service regimentally. As pointed out in the previous edition of this work, it would be absurd to attempt such a system with a large army in the field. The ambulance establishment is in future to be attached to divisions, and to independent brigades of cavalry.

The "Ambulance Committee" has recommended that for each division there should be 76 ambulance waggons, 7 medical officers, and a detachment of the A.H.C., consisting of 3 officers, 9 non-commissioned officers, and 150 stretcher-bearers; and for a brigade of cavalry, 17 ambulance waggons, 2 medical officers, and a detachment of the A.H.C., consisting of 1 officer, 3 non-commissioned officers, and 36 stretcher-bearers.

These numbers include all persons required for tending wounded on the field, and for collecting and placing them in the ambulances, and ministering to their wants during journey to hospital. The horses, drivers, and officers to look after them, for these ambulance waggons, will be found by the A.S.C. This proportion is extravagant, being calculated upon the assumption that no transport aid whatsoever can be obtained from the country where operations are being carried on.

The old-fashioned system of depending upon bandsmen for the removal of the wounded will thus be avoided, and a stop can in consequence be put to the nefarious and demoralizing practice of permitting men to leave their ranks whilst in actual contact with an enemy for the purpose of removing or assisting wounded to the rear.

Medical Stores.—The regulation stretcher weighs 15 lbs.; a pair of cacolets complete, with pack saddle, 120 lbs.

In Bengal, 1 privates' tent (intended for 16 men—not sick) is allowed for every 100 men in the corps for sick, and 1 for hospital stores. 1 staff sergeants' tent to each of the 3 medical subordinates, and 1 Paul as a latrine. 10 dhoolies are allowed per company; there are 6 bearers to each. A dhoolie weighs 136 lbs. Those made in Hong Kong in 1860 only weighed 58 lbs., and answered very well.

The panniers supplied to Regiments, Batteries, &c., contain medicine and

instruments. Complete with pack saddle, they weigh 267 lbs. The medical Field Companion contains an assortment of the most urgently required physic, bandages, plasters, &c., and weighs 11 lbs. 4 oz. It is carried by an orderly.

Hospital Ships, for the transport of sick and wounded from the theatre of war to England, should be fitted up immediately that war is determined upon; those prepared for the Gold Coast in 1873 can be followed as models. Standing bed places should be provided for the sick, who should have about 300 cubic feet each. We have numbers of old screw line-of-battle ships suited above all other ships for this purpose. If the voyages are short, and the weather sufficiently settled to permit of vessels being towed by steamers, good roomy sailing ships are the best for hospital purposes. These vessels should be under the order of the P.M.O. or chief controller, and no naval officer should have power over them.

Veterinary Department.—There should be a chief veterinary surgeon in charge of the whole department, who should be stationed at head-quarters. A veterinary surgeon is attached to each infantry division, to be in charge of all the animals belonging to it. He is provided with two cases of medical stores, each weighing 80 lbs., for which public conveyance is granted, and has under his orders one farrier and one shoeing-smith for every 50 horses that he has charge of; he is accountable for their due attention to their duties. Chests of tools (forge and shoeing) are issued, one to every four farriers or shoeing-smiths, and one forge waggon to every 200 horses or mules. Horse-shoes, tools, forges, &c., for the combatant services will be drawn by officers commanding corps from the control department.

The A.Q.M.G. or senior S.O. of each division has the custody of all forge waggons, horse-shoes, &c., required by veterinary surgeons in charge of the horses, &c., of that division. Whenever stores are required, the A.Q.M.G. obtains them in the usual manner from the control department. This does not apply to horse medicines, which are obtained by the veterinary surgeon as he requires them from the head of his department with the army.

When an officer requires his horse, &c., to be shod, he will make a written requisition upon the veterinary surgeon in charge of his division. All such requisitions to be forwarded to the control department, so that the expense may be recovered by the military accountant. The price to be charged will be published in G.O. Between the base of operations and the army there will be a six months' supply of medicine, which will be in charge of the control department. The proportion of veterinary surgeons should be one to every 400 horses.

The Staff is to an army what steam is to a locomotive. The machine itself may be of the highest order, the engineer who directs it may be a

man of first-class talent, but without the motive power of steam it is merely a huge collection of well-polished material.

Every successive invention applicable to military science adds to the necessity for a staff, increases its duties, and entails the employment of more officers on it. It is not possible for the most transcendent genius to command an army successfully without able assistance from others in matters of detail. Armies are held together by discipline, and discipline is essentially a matter of detail and attention to small things. By no means the smallest talent of great soldiers has been that which they have displayed in their selection of able assistants.

The best example of how helpless an army must be without an efficient staff is that afforded by the army organised at Washington by M'Clellan, and, in a lesser degree, by his successors. Hundreds of thousands of men were enrolled, splendidly equipped, abundantly fed, provided with all sorts of artillery and engineer material of the most approved patterns and upon the most lavish scale; yet, as a distinguished officer said, it was a huge giant lying prostrate on the ground, who, though powerful in outward appearance, was destitute of bones and muscle, and consequently helpless for action. The bone and muscle required was a good staff to put it properly in motion. In the Southern Army, affairs were never so badly conducted as at the North, which, in a great measure, is to be accounted for by the fact of its having received into its ranks the large proportion of regular officers who had been educated at West Point.

The greatest care should be exercised in the selection of S.Os. The principal ones should be chosen by the General commanding an army in the field. If he is to be held responsible for its safety and success, it is not fair to force him to use confidential agents selected by others, and of whose ability he may, perhaps, have no opinion. If he is fit to command he is qualified to make a good choice; and if not, it is criminal to leave him in command for an hour. If he had no higher motive than personal interest, it would be enough to make him select the best men. Unhappily for England, the civil and political elements enter largely into our military affairs, and it may be generally assumed that when 'Dowb' has been taken care of, the order for his appointment did not emanate from the officer commanding in the field.

Since the establishment of the Staff College by H.R.H. the present Commander-in-chief, all zealous officers can fit themselves theoretically for the highest duties in our service, and in our next great war we shall have but few on the staff who have not taken degrees there.

With modern armies it is almost an impossibility that a man can be fit for any important command without long study and deep reflection thereon. We have the greatest of all Generals' authority for this, and he was ever most emphatic in urging upon others the necessity for pondering over the

histories of all great soldiers. Doubtless there will always be men of weak minds, to whom reading can only impart a smattering of knowledge, which, in moments requiring promptness, will cause them to theorise instead of to act; men who make their doings subordinate to their book knowledge. Well may it be said that a little knowledge is dangerous. See them in action, and they are busy attempting some grand manœuvre learnt from Jomini, which is probably only completed in time to have a long shot at the enemy's rear-guard. The higher qualifications for command can never be learnt from books, although he who is endowed by nature with the mental and physical power indispensable for an officer, can develop his ability a hundredfold by study. A staff officer should be young in body but old in mind: unless gifted with good eyesight he cannot be of much use on service, as it is essential that he should be quick and skilled in judging distances, and in forming correct estimates of the number of men formed in columns or deployed that may be occupying any position he has to examine from a distance. The practice acquired by the eye in surveying is invaluable, as it accustoms one to be observant of ground and of land-marks, and to estimate distances correctly.

The three great qualifications for all officers, from the general to the ensign, are, 1st, daring courage; 2nd, quick ability; and 3rd, a healthy, powerful physique. We are prone to forget how much the last-named enters into the attributes of a good soldier. A man who cannot bear fatigue, who is not of active habits, and who cannot ride well, is useless as a S.O. Being a good sportsman, a good cricketer, good at rackets, or any other manly game, is no mean recommendation for staff employments. Such a man, without book lore, is preferable to the most deeply-read one of lethargic habits. The worst S.O. I knew in the Crimea had taken the highest degree in the senior department at Sandhurst. I do not wish to insinuate that learning is injurious, but to prove that scientific attainments alone can never make a staff officer.

By a recent order the staff of the army is to be consolidated, but as their titles have not yet been finally determined upon, the old ones of Adjutant-General, Quartermaster-General, &c. &c., have been retained in the following tables.

Detail of Executive Staff for Corps, Divisions, &c., with an army in the field, is as follows:—

DETAIL OF THE STAFF OF A BRIGADE OF CAVALRY.

——	Number.	Staff Clerks.			Horses.
		First Class.	Second Class.	Third Class.	
Major-General Commanding . . .	1	..	..	..	5
Brigade Major	1	..	..	1	3
Aide-de-Camp	1	..	..	..	3
Total	3	..	..	1	11

DETAIL OF THE STAFF OF A BRIGADE OF INFANTRY.

Major-General Commanding . . .	1	..	..	..	5
Brigade Major	1	..	..	1	3
Aide-de-Camp	1	..	..	..	3
Total	3	..	..	1	11

DETAIL OF THE STAFF OF A DIVISION OF INFANTRY.

Lieutenant-General Commanding .	1	..	..	..	6
Aides-de-Camp	2	..	..	..	6
Assistant Adjutant or Quartermaster Generals	2	..	2	2	6
Deputy Assistant Adjutant or Quartermaster General	1	..	..	..	3
Lieutenant-Colonel, R.A.	1	..	..	1	3
Adjutant, R.A.	1	..	..	..	2
Lieutenant-Colonel, R.E.	1	..	..	1	3
Adjutant, R.E.	1	..	..	..	2
Total	10	..	2	4	31

DETAIL OF THE STAFF OF AN ARMY CORPS.

—	Number.	Staff Clerks.			Horses.
		First Class.	Second Class.	Third Class.	
General Commanding	1	..	..	..	8
Aides-de-Camp	4	..	..	..	12
Deputy Adjutant or Quartermaster Generals	2	2	2	2	8
Assistant Adjutant or Quartermaster Generals	2	..	2	2	6
Deputy Assistant Adjutant or Quartermaster Generals	2	..	..	..	6
Brigadier-General, R.A.	1	..	..	..	5
Brigade Major, R.A.	1	..	..	1	3
Aide-de-Camp, R.A.	1	..	..	..	3
Colonel Commanding, R E. . . .	1	..	..	..	5
Brigade Major, R.E.	1	..	..	1	3
Aide-de-Camp, R.E.	1	..	..	..	3
Commandant at Head Quarters . .	1	..	..	..	3
Provost Marshal	1	..	..	..	2
Total	19	2	4	6	67

Many advocate the formation of a staff corps on the French system, but, beyond all doubt, our plan of selecting officers from regiments as required is much better; they remain on the staff as long as required, and then return to regimental work. It is desirable that all men should have opportunities of serving on the staff, and that employment thereon should not be strictly reserved for one especial corps. When an officer who has never done any but regimental duty all his life, becomes a general, he finds himself in a difficult position, which a little staff experience in war would have rendered him familiar with. To command all three arms on service is not so easy as it seems at a field day. When employed in the active duties of a campaign, S.Os. have such an extensive field for their study, and, being behind the scenes, such opportunities of learning their profession, that regimental officers can seldom compete with them in the art of war.

COMMANDANT OF HEAD-QUARTERS.—There is always such an officer with armies in the field. He should be an Assistant Q.M. General, and will regulate all matters concerning the quartering of every one that is

attached in any way to head-quarters: he marks out the camp, when tents are used, and allots quarters to every one according to their seniority, when head-quarters are to be in buildings. The best form for a head-quarter camp is as three sides of a square, the general being in the centre, all the tents facing inwards, the clerks, orderlies, servants, &c., being in a second row.

The commandant is responsible for the cleanliness and police duties in and around head-quarters, and it must be clearly understood that all officers and soldiers, no matter what their rank may be, are implicitly to obey his orders as coming from the general himself. When a move is to be made, the commandant sends round a written memorandum of instructions to all concerned, giving full details as to the order of march, the hour at which the baggage is to be loaded, tents struck, &c. Any officers failing to receive such instructions should understand that it is their duty to see the commandant to ask for information. The commandant should keep a nominal list of every individual attached to head-quarters and a return of the number of their horses. Heads of departments must notify all changes to him as soon as they occur. All ranks going to head-quarters, if only to remain there for a night, must report their arrival to the commandant, who will allot them quarters, or point out where their tents are to be pitched. He also has charge of the forge, and the shoeing-smith at head-quarters will take orders only from him. He should have under him a couple of the military police, to assist in carrying out his orders. He will also be paymaster, and will estimate for, and draw from the military chest, the pay of all N. C. officers and privates attached to head-quarters, consequently No. 1 reports must be sent to him with every man arriving there.

GENERAL DUTIES OF STAFF OFFICERS.—The following extracts are from the Queen's Regulations, and intended for the guidance of general and other staff officers. With an amalgamated staff all these duties will be performed by it under the orders of the senior S.O. with each Army Corps, Division, &c.

It is by the zealous exertions and constant superintendence of the general officers, that the system of discipline essential to the reputation and success of Her Majesty's arms is to be maintained.

General officers intrusted with command are responsible, not only for the discipline of the troops, and their constant preparation for active service, but likewise—in case of attack—for the immediate and advantageous disposal of every description of force placed under their control. They are to inform themselves of the resources of their stations in regard to provisions, labourers, horses, and the means of transporting troops and stores, and to obtain an accurate knowledge of the strong features of the country, and of all military depôts within their respective commands, of all fortified

places and their means of defence, and of every particular which may increase their power of acting with advantage against an invading enemy; it is also necessary that they should possess an intimate acquaintance with the assailable points of the country. Without information on these heads, no plan of attack or of defence can be formed.

It is equally incumbent on generals commanding, to ascertain that the general and S.Os. under their command are well versed in their several duties, and that they are competent, both from general intelligence and acquired local information, to render that assistance which, from the nature of their appointment, they are expected to afford.

General officers in command are to be prepared at all times to afford the C.-in-C. any information he may require, as to the efficiency of any particular corps with regard to its discipline, equipment, and preparation for immediate service.

General officers are not at any time to change the quarters assigned them, nor under any circumstances to quit their commands without special permission. In applying for temporary leave of absence from the C.-in-C., they are to report to the chief of the staff the name and rank of the officer on whom their command will devolve.

When any general or other officer quits his command, he is to deliver to the officer who succeeds him the books containing the orders relating to the station under his command, and all official books and documents, confidential or otherwise, which may have been received from the S.S. for War.

Duties.—Staff officers should consider it a part of their duty to make themselves thoroughly acquainted with the nature of the country in the vicinity of their station, more particularly with the roads, passes, defiles, bridges, and fords; this should be done, not only by consulting maps and plans, but also by personal observation, and by acquiring local information. They should further obtain a general knowledge of the resources of the country in the neighbourhood, as regards the description of crops usually grown, the supply of provisions, and means of transport. The zeal and industry which an officer may exhibit on these points will not only afford a ready means of bringing himself favourably to notice, but will also enable him, when requisite, to render that assistance which, from the nature of his appointment, his superiors have every right to expect from him.

In order to avoid the possibility of being misunderstood, S.Os. are to make it a rule to deliver all verbal orders intrusted to them in the plainest and most concise terms, and these orders are to be obeyed with the same readiness as if delivered personally by the general officers to whom such staff officers are attached.

The detail of the duties of the district or stations is confided to the A.G.'s department, the senior officer of which is responsible for the accuracy of the district returns. He is also the channel through which the orders are issued. It is essential, therefore, that he should have a clear and concise mode of communicating the orders he may from time to time receive, and be exact in whatever correspondence he may be engaged in by the direction of the general officer commanding. The various subjects of correspondence which should pass through the A.G. department, are detailed in page 83.

The officer in charge of the Q.M.G. department is intrusted, under the orders of the

general in command, with the duty of quartering, encamping, embarking, disembarking, and moving the troops. It is his duty to control the issue and maintain the efficiency of all articles of camp equipage, and such army stores as are not included in the personal equipment of the troops or in fixed armaments.

The officers of this department are required to have a perfect knowledge of the state of the roads, and the features of the country applicable to defence, also of the course of rivers and the power of inundation. In coast districts, they are further to possess accurate information of practicable points of landing, the best positions for defence in their immediate vicinity, and the particular winds and periods of tide that afford an enemy facility in approaching the coast. The correspondence of the district or division which should pass through the Q.M.G. department, for the information of the general officer commanding, is detailed at page 83.

The military or assistant military secretary is the confidential secretary of the general officer to whose staff he belongs. He is the channel of communication on all subjects connected with promotion and patronage, and such as do not fall within the province of the departments of the A.G. and Q.M.G.

The B.M. is the channel through which all orders are received and communicated to the brigade. He is considered as an officer attached to the brigade; not to the personal staff of the officer commanding it. He is to keep and regulate the roster of the brigade duties, to inspect all the guards, outposts, and piquets furnished by the brigade, and he is responsible for such guards, piquets, &c., being withdrawn when the brigade is to march. His station on a march is in front of the leading regiment of the brigade; he is to encamp in rear of the centre of the brigade, and he or an orderly adjutant is to be constantly in the lines of the camp. All reports and correspondence for the information of the officer commanding the brigade are to be addressed to, and transmitted through, the B.M.

Staff officers should carry in their heads all general information regarding the army with which they are serving; the composition and distribution of corps, divisions, brigades, &c.; they should remember as accurately as possible the strength of each battalion in their immediate division, and the names of the respective commanding officers. Officers of the head-quarter staff should know the position of every division or detachment each night; their composition and strength, and the names of their commanders, &c.

In communicating orders to others, S.Os. must speak and write in the name of their generals. They must remember that they have no power of themselves to confer favours, and that all patronage rests with the general. In theory they are merely his agents, and although in practice, officers of importance have much in their power, they should be careful to prevent its being generally known. Their commander must never be ignored, even when they know him to be a fool. It is not that you injure an individual by slighting him, but that by doing so you deprive him of that general confidence which, for the public good, it is essential he should possess.

During an action or any extensive operations, it is frequently necessary to send written orders or instructions to the generals commanding detached forces or columns acting beyond the immediate control of the commander. These are always written in haste, but it is essential that they should be free from clerical errors, and expressed in the clearest terms; nothing can be worse policy than overhaste in writing such orders. Indicate at top of the paper the spot where you are writing: it is to be presumed that all the staff have the same map: find out on yours where you are, and describe the spot as it is there shown. For example: 'Farm-house on road to —— close to letter L of Ripley on staff map, about — miles from ——; 4th June, 1873, 7 A.M.' Never omit to state the exact hour. It is also advisable to give a rough outline of what is taking place in your immediate vicinity, and of the last reliable information obtained regarding the enemy's position, distribution, movements, and strength.

In delivering verbal orders, and in their dealings with superior officers, the staff should be most respectful, remembering that they are but the agents of the general, and paid public servants. A staff officer should feel bound by his position, if not by his breeding, to treat every one with the courtesy due from one gentleman to another. Some S.Os. acquire a notoriety by brusqueness and incivility. When such men are tolerated it is always to the detriment of the army. The motto for the staff should be 'Affability and reticence.'

With young officers first appointed to the staff the position is for some time very novel. The operations and movements they may have taken part in previously had been performed mechanically, their object being unknown, and but few caring to inquire into the subject. On the staff it is otherwise; one is more or less behind the scenes, and young men thus sometimes become the repository of important news, secrets, or orders. Regimental officers look to their friends on the staff for information as to what is going on, and endeavour to pump them accordingly. Reticence is therefore a virtue that cannot be too much practised and fostered by all S.Os. Some seem to think it necessary by their manner to cause the outside world to believe that they are oppressed with hard work, and engaged upon secret duties of paramount consequence: that they are in possession of important secrets and know exactly the general's intentions, and what operations are contemplated. This is not only foolish but wrong, for if the impression they convey is correct it is nearly as bad as if they revealed all they had been ordered to keep secret. It is always advisable to profess entire ignorance regarding coming events. If men try to pump you, parry the questions by 'indeed,' and with all sincerity lead them to believe that you do not answer them because you do not know yourself. Staff officers should never be exclusive in their acquaintance, but should mix freely with regimental officers, as it is essential that they and the generals through them should be

au courant of the camp-rumours and of the opinions of the army as to events and the actors in them. Camp-rumours are sometimes of importance, for the information transmitted to the enemy by spies will for the most part be framed upon them. Many a success has been obtained by circulating rumours of intended movements and then doing the very reverse.

It should be imperative that every S.O. should keep a journal; all that he does during the day, together with a précis of what goes on around him, to be noted therein. An official journal has hitherto been always kept in the Q.M.G.'s office, which entered into minute details regarding every operation. A similar journal was kept by the A.Q.M.G. of each division, in which full details were given regarding all its particular doings, the actions in which it is engaged, its effective strength, number of deaths, admission to and discharges from hospital; the weather, &c., &c. Similar journals will in future be kept by the chief of the staff and by the senior S.O. with each division.

Correspondence.—The management of official correspondence in the field is a most difficult matter; the sooner an authorized system is established for it the better. When an English army begins a campaign, some system has to be inaugurated by the C. of the S., or, in his absence, by the heads of the several departments. The following practical suggestions may be of use to officers called upon to do so.

It should be remembered that on service the smaller the amount of paper and pen work the better. A certain quantity cannot be dispensed with, but the absurdity of heads of departments corresponding with one another when their tents are close together, should be put an end to. When the staff has been consolidated, and all the duties are done under one head, the correspondence necessary for business will be much reduced.

Under any circumstances there is a great deal of work that is now done in writing which can be done verbally, and when it is necessary to send letters or memoranda to the several divisions, instead of entering them in a letter-book, they should be marked '*to be returned*,' the recipient signing them as seen, and returning them by the same messenger; when returned they should be kept in a guard-book, or sent to the depôt for correspondence in rear.

All papers should, when written or received, be classed under three heads, say A, B, and C: A to be papers that must be retained with the army or division; B to be papers that are to be preserved, but which without inconvenience to administration can be sent to some depôt in rear named for their reception; and C to be those of an ephemeral nature that may be destroyed at once, or within a few days after date.

To carry out such a system there should be an organised office for the correspondence of the army, somewhere in rear of the army, to be situated

on a line of rail, or on the best line of communication between the base and the army.

Circumstances should determine its position and the distance it is to be in rear. There should be an officer in charge of it, to whom all papers of class B should be forwarded by the heads of departments at head-quarters, who should collect them weekly from divisions. At such depôt there should be a printing-press, and a special telegraph-wire should lead from the depôt to army head-quarters. If the war is of considerable duration, the officer at the depôt will take the orders of the C. of the S. as to the disposal of all papers over three months old, for it is advisable that they should be forwarded to England to the several departments concerned, or collected in some one office at the Horse Guards.

This is the general outline of how an army in the field should be kept clear of piles of correspondence. The Artillery above all other corps seem to revel in complicated returns; it would be well if a Board were assembled upon the breaking out of a war, to be composed of staff officers, who should go minutely into the question of the returns to be furnished by corps which are really necessary for the due administration of the army; they should take the opinions of able officers of the several arms, and having heard all that can be said in favour of the returns required in peace, determine those that are absolutely necessary in a period of war. The existing system is for corps to send in their returns to the staff of their divisions, by whom a general return is made out from them, and sent to head-quarters, where the divisional returns are collated into one general return for the authorities at home. This is a little farce which should not be acted in the field. The returns should be sent home in original.

In official letters there is some twaddle that can be dispensed with: the prelude is too long and the style too ceremonious. By substituting memoranda for letters, much can be done towards curtailing clerical labour. The half-sheet of foolscap on which they are written should be folded in four divisions, as is the custom. On the back of the first of these divisions a second memorandum can be written by the recipient in answer to it, or in forwarding it on to some other department. A sheet thus folded has places for four memoranda on the back, so that if it has to go to that number of people, all that they have to say on the subject is on the one half-sheet of foolscap. This system is common in India, where it works well; the writer introduced it in Canada, where it has answered well for the last seven years. It is a great improvement on the system of turning down corners, for if there are several memoranda on the same paper, it is difficult to follow them in proper sequence when they are written without any order, and in all sorts of directions. Each department should have a registry book, in which should be recorded every letter or memorandum received and sent out, the latter to be in red ink; there should be columns for the date and hour of

receipt or despatch, the name of orderly intrusted with its delivery, from whom, or to whom sent, date and purport of the letter, and a spare column for other communications on the same subject, and for stating how the matter has been finally disposed of. To each will be given a general register *No.*, which will be recorded also on the paper itself in red ink. To this book there will be an alphabetical index at the end of each volume for facility of reference; two volumes will be retained at head-quarters; as soon as it is necessary to begin a third, the first will be sent to the depôt in rear, where a general index will be made from all such books according to subjects, so that if the chief of the staff requires to refer back at any time to a subject disposed of some months previously, he can telegraph to the depôt of correspondence, to have papers regarding it sent to him by next post.

The officer in charge of the depôt should be especially selected for the post as being accustomed to the routine of office-work, and the classification of correspondence.

The following extracts from the Queen's Regulations give the necessary information as to the proper channel of communication, and the departments to which the several subjects connected with an army in the field should be addressed.

General or other officers in command are to sign all official letters and reports which are intended for submission to the C.-in-C.; and all officers, in making reports or applications, and in fixing their names to any public documents, are to specify under their signatures—which must be legibly written—their rank and the regiments, or departments, to which they belong.

Official letters are to contain full information of all particulars upon the subject to which they relate. Each letter is to refer to one subject only, and is to be written on foolscap paper, with a convenient (*i.e.*, from half to quarter) margin; the margin always to be left on the inner side of each page. The paragraphs are to be numbered and the inclosures (if any) described in the margin or in a separate schedule. As a general rule, when the letter extends beyond one page, or is accompanied by inclosures, it should be written on a whole sheet. The transmission of unnecessary inclosures is to be avoided, and when additional papers are forwarded all blank fly-leaves are to be removed from them.

Superior officers and other intermediate authorities are responsible for the correctness of what is set forth in documents submitted by them. It is their duty to endeavour to adjust all matters that come within the scope of their authority; and, in transmitting applications or correspondence to head-quarters, they are invariably to state their concurrence, or otherwise, adding such additional observations, based on local knowledge, as may be necessary to enable the authorities to come to a final decision on the question without further reference and correspondence.

Applications from regimental officers are, in the first instance, to be submitted to the

commanding officers of their corps. Applications from N.C.Os., trumpeters, drummers, and private soldiers are to be made personally through the captains or commanding officers of their troops, batteries, or companies to the commanding officers of their corps. Commanding officers are to forward, through the prescribed channel, for the consideration of the C.-in.-C., a statement of such applications or claims as are deemed to be correct and reasonable, specifying at the same time the grounds on which they recommend that the requests be granted.

A strict observance of the prescribed channel of communication is enjoined on the part of all officers, whether in the actual performance of duty or not, except under special circumstances where a direct reference may be necessary. Any officer who, on his own responsibility, transmits documents otherwise than through the proper channel, must fully explain the causes which induce him to do so, and, at the same time, forward copies for the information of the authority through whom they should have passed in regular course.

In direct correspondence between one general officer and another, between commanding officers, and between heads of departments, letters are to be signed by the superior officers, and not by their staff or subordinate officers. When an officer employs his staff to conduct any correspondence with another officer of similar rank or position, the staff of that officer is to be addressed.

Whenever general or other officers in command obtain temporary leave to be absent from their divisions, brigades, or stations, the officers next in command are to open any official letters that may arrive, and act upon their contents.

In addressing letters, the official position and not the names of those for whom they are intended, is to be written on the envelope.

Access to official records is only permitted to those who are intrusted with the duties of the office or departments to which they belong, and the same are not to be made public, or communicated to individuals unconnected with such offices or departments without the knowledge or sanction of the authorities concerned. The only legitimate use an officer can make of documents or information of which he may become possessed in his official capacity, is for the furtherance of the public service in the performance of his duty. If his official conduct be impugned, he is at liberty to seek redress by an appeal to superior authority through the regular channel. On the other hand, his publishing official documents, or availing himself of them for carrying on personal controversies, or for any private purpose, without due authority, will be viewed and treated as a positive breach of official trust.

THE CHIEF OF THE STAFF.—All correspondence, except that detailed below, which is to be sent to the S. of S. for War, will in future be forwarded through the usual channels to the C. of the S. Where the nomenclature of Adjutant and Q.M.G. is still maintained, the following subjects will be sent to those respective departments.

The correspondence which is to be addressed to the A.G. will comprise, generally, all subjects connected with the discipline, duties, military

training, and efficiency of the army, and may be classified in detail under the following heads:—Ammunition, arms, armourers, bands and bandmasters, books and records, clothing, colours and distinctions, confidential reports, courts-martial; depôts, formation of; discharge of soldiers, discipline, drafts proceeding abroad, duties in garrison, equipment (personal only), examination of officers for promotion, furloughs, issue of general orders; guards of honour and royal escorts, gymnastics, horses, remounts and casting; inspections, half-yearly; invaliding; leave of absence; medals for long service and good conduct; messes of officers; militia; musketry instruction; N.C. officers' promotion at depôts; passages of individual officers; posting of officers to battalions; recruiting; regulations (Queen's); salutes and state ceremonies; sergeant cooks, tailors, &c., training and appointment of; service and depôt companies, interchanges between; services forfeited, applications for restoration of; staff clerks; staff college, candidates for; transfers; volunteering from one corps to another.

THE Q.M.G.—All correspondence relating to the following subjects is to be forwarded by general officers commanding to the Q.M.G.

The movement of troops by land or sea, including arrangements for the conveyance of baggage and military stores, and duties connected with embarkations, disembarkations, and the accommodation of troops and their families on board ship.

The issue of routes.

The quartering, billeting, and cantoning of troops; soldiers' gardens, the establishment of regimental workshops, canteens, &c., system of cooking, and the employment of the troops, whether by paid or fatigue labour, on public works, and military defences.

The occupation of ground by troops, the order of march, the formation of encampments, and military surveys, reconnaissances, and journals of the movements and operations of an army in the field.

THE S. OF S. FOR WAR.—The correspondence to be transmitted to the W.O. (addressed to the Under S. of S. of War) is to comprise, generally, the following subjects:—

Applications relative to military disbursements or claims to pay and allowances in money or in kind.

Applications for spare parts of arms (barrels excepted) on repayment, and for browning materials.

Annual requisitions for clothing, with size rolls, &c., and the proceedings of Boards of Survey on necessaries in cases where no rejections are made.

Applications for stationery and printed forms.

Reports and correspondence regarding deserters.

Applications for soldiers to reckon service towards good-conduct pay and pension, and completion of limited engagement. (This does not apply to forfeited service.)

Correspondence connected with the distribution of war medals, and the restoration of forfeited medals.

THE S. OF S. FOR WAR (through the Controller).—Proposals for the construction, repair, occupation, and appropriation of barracks, troop-stables, hut-encampments, and buildings required for the use of the troops.

Special applications for barrack stores and allowances which are not provided for by existing regulations.

The construction and hire of rifle ranges, practice and exercising grounds for the different arms of the service, cricket grounds, the issue of camp equipage and army stores for general field service.

Whenever questions arise bearing on military defences, the construction or alteration of barracks, the care or use of military lands, &c., officers commanding districts or stations are invariably to obtain the professional opinion of the C.R.E. before transmitting correspondence on these subjects to the S. of S. for War. In like manner all applications regarding the re-appropriation of barrack buildings or issues of fuel, light and lodging money, are to be referred with the remarks of the Controller.

General officers commanding at stations abroad being responsible to the S. of S. for War for the due performance of the financial and executive duties of the War Department within the limits of their command, correspond direct with the Secretary of State on all subjects relating to those administrative duties upon which the instructions proceed direct from the W.O. It is to be understood, however, that this practice is not to interfere with the usual course of correspondence between such officers and the C.-in-C. in regard to the military discipline, duties, movements, encampments, interior economy, &c., of the troops under their command, as laid down in the foregoing regulations.

Orders.—The general orders are published by the C. of the S., or the A.G., as the case may be. They should only contain what it is advisable that every one in the army should know. The movements of individual divisions or detachments should be directed by special memoranda issued by the Q.M.G., or C. of the S., where there is no Q.M.G. The general orders should be telegraphed daily to the depôt of correspondence in rear, and printed at once; they will be forwarded without delay for distribution to the several corps. They should be upon paper with a margin, so as to be put into a guard-book. It is a good thing to classify general orders under two heads —1, those that are of a nature not requiring to be constantly borne in mind, such as the promotion of an ensign to a lieutenancy; 2, those that should be read to the men once a week or fortnight, such as regulations connected with marching and discipline, &c. The latter should not appear in the daily G.Os., but be printed on separate paper in small type, so as to be easily pasted into the pocket-book. It would be a good plan to reprint, every three or six months, in a collected form, all such special orders, printing a sufficient number of copies, so that every officer might have one. They should be printed in small type, and on one side of the paper only, for the purpose of being pasted into the pocket-book. The wording of all orders should be as concise as possible. The A.A.G. or senior S.O. of each

division will attend daily at 11 A.M. precisely, at the office of the A.G. or C. of the S., at head-quarters, to receive orders. The brigade majors or S.O. of the brigade will attend daily, at 12·30 P.M., at the tents of the A.A.G. or senior S.O. of their divisions, to receive the divisional orders, and the adjutants of regiments will assemble at the brigade office, at 2 P.M., to receive the brigade orders. Circumstances may, of course, render a change of hours sometimes necessary. All orders received by adjutants to be read to the men at the first parade. On marching days, the senior S.O. of each division, or the A.A.Gs. and A.Q.M.Gs., when there are such officers, will attend at the head-quarters of their departments as soon as the camp is pitched. When there is not time to write out several copies of an order, staff officers in communicating it to the brigades, and so on to the regiments, can send it round by an orderly to the several corps concerned, by whom it will be copied at once, and signed by the colonel commanding, who will return it to the orderly to take it on to the next regiment, and so on; when all have signed it, it is brought back to the S.O. who wrote it, who can see by the signatures that all have seen and copied it. All orders must be signed by the S.Os. that issue them.

Detailing Duties.—When any particular number of men are required for a duty, the largest possible unit of formation, from an army corps to a company, should be employed. When less than a battalion is wanted, the number of men and not the number of companies should be stated in the order to the commanding officer, who will, however, send as many complete companies as possible—a discrepancy of say 10 per cent. either above or under the number ordered being allowed—so as to prevent the necessity of breaking up companies.

Communications and Post-Office.—During the Peninsular war, a small corps of guides, under the command of an A.Q.M.G., had general charge of the communications of the army and post-office. The police attached to divisions and army corps should in future perform the work done by the guides in Spain, in addition to the police duties as described in the article on that subject. The general line of communications must be under the Q.M.G., or chief of the staff when there is no Q.M.G.; but there should be with an army of 30,000 men and upwards a good civil staff in charge of the postal details (to be obtained from post-office authorities at home), the superintendent of which, living at head-quarters, should take his orders from the Q.M.G. The nature and distribution of the army, and the frequency of communications with England, must decide the details required for the due collection, despatch, receipt, and distribution of letters. The letters should be made up in England in bags addressed to each division, and when received at head-quarters should be despatched at once

to the A.Q.M.Gs. or senior S.O. of the respective divisions, by whom they will be opened and distributed to corps, who will send a N.C.O. for them. This N.C.O. should sign in a postal book (to be kept by each A.Q.M.G.) for the number of letters he receives, especially detailing any that may be registered. A pre-arranged bugle-call should be sounded from the guard at the division head-quarters, to intimate to regiments to send for letters. The stamping of letters by soldiers in the field should not be required, and the recipients of them at home should only be charged the ordinary rate of postage. The collection of money from those in the field to be avoided, by its being ruled in England that none but prepaid letters would be forwarded to the seat of war. In this manner the post-office clerks with the army would be relieved of much troublesome work, and their duties simplified.

In the Ashanti war it was found indispensable to have one combatant officer of rank in charge both of the transport service and of the line of communication; all the many fortified posts along it, and all troops moving by it in rear of the manœuvring army, being under his orders. The postal duties were well carried out by the armed police, whose posts in rear were also amenable to the orders of the officer in command of the line of communications.

Messages of all sorts sent by mounted orderlies should have the address written legibly on the covers, full particulars being given regarding the corps (and their locality) for which they are intended. The pace at which they are to travel and the hour of despatch to be also noted on the cover. The recipient will sign the envelope as received, stating the exact hour of receipt, and send it back by the orderly.

In sending important messages where it is possible the bearer may fall into the hands of the enemy, only the most trustworthy men should be employed. They should carry two despatches—one real, the other false. The latter, to be made up like an ordinary letter, will be carried in the pocket or sabretash. The real one, written in cipher on very thin paper, to be rolled up and placed in a short piece of quill, which can easily be concealed about the person or in a cartridge. Never trust to one messenger for the safe delivery of important messages; send a duplicate, and sometimes even a triplicate, at two or three hours' interval, without allowing the bearers to know that their messages are the same.

Staff Duties during an Action.—A staff officer in action should be all eyes and ears. When stationary anywhere, his telescope should be employed without intermission, and everything remarkable that he sees at once reported to his immediate superior.

The staff should accompany their general, but should not remain too

close to him. Generals should indicate beforehand what officers they wish to remain with them, and at what distance they wish the others to be. A large staff is likely to attract attention, and draw fire. It is advisable that a general should keep with him that S.O. in whom he confides, and whose opinion he most values. Two or three As.D.C. should follow at about 30 yards' distance. Unless called by name, they should take it in turn to go with orders. The rest of the staff should remain about 100 yards off, the senior officer taking care, when all the As.D.C. have been despatched with orders, that their places are taken by well-mounted, good riders, selected from the officers of the A.G. and Q.M.G. departments.

The French system of having a small flag carried in front of each general commanding a division is admirable. Each division should have a distinctive mark to be on all its transport and equipage. A similar badge should form the general's distinguishing pennant. An officer sent with an order has then no difficulty in finding the general commanding any particular division. The C.-in-C. should in similar manner have a small union-jack carried by his escort in moving from a position he had once taken up during an action. Care should be taken by the A.G., or chief of the staff, to leave an orderly there with information as to where the head-quarter staff is to be found.

Negligence concerning such little trifling matters leads frequently to great inconvenience; and as our staff is not organised as a corps, but is collected from regiments at the commencement of a campaign, it takes some time to systematise its duties and organise their detail.

Every S.O. should take notes during an action of all remarkable occurrences; his watch must be frequently looked at, and the hour when the first shot was fired, &c., &c., noted; the time when the order is given for all important movements to be recorded, as well as the time when they were executed.

A staff officer should be cool to the utmost extent. If by nature he is excitable, a strong curb must be placed upon his manner, for no one has confidence in reports that are made in an excited way. His verbal reports should be almost impassive in the style in which they are made. He should always look jolly and as unconcerned as if engaged in that complicated operation of attacking a supposed enemy at "Cæsar's camp." Excitement is painfully catching. A staff officer galloping, in a high state of excitement, with an order to a column, may play 'old Harry' with the spirits of the men, and cause them to think there is some unknown danger, or that things in other parts of the field are not going on as they should: it gives rise to a hundred speculations of a gloomy nature; whereas the man who gallops up, no matter how quickly, but with a smiling face, and gives his orders precisely without any flurry, having a nod for his acquaintances in the ranks and perhaps a flying remark for them, spreads abroad a feeling of security

and success, which soon reaches the smallest bugler, making all feel that they are on the winning side.

I once saw a S.O. gallop with an order to a column of cavalry and artillery, which had been drawn up behind a village to be sheltered from fire, and as he was near it a round shot struck the ground under his horse's belly. The horse made an effort to swerve a little, which was checked by its rider without taking a cigar he was smoking from his mouth, apparently taking no notice whatever of the occurrence. He galloped up to the column, coolly gave his orders, and galloped back again over the open space outside the village, where the round shot were striking pretty thickly, still smoking his cigar, as if he were taking his morning exercise. A few shot had previously plunged into the column and caused some excitement, as it always does when horses get knocked over ; but the jolly indifference of this officer, in fact the manner in which he appeared to ignore altogether the existence of any danger, had a capital effect upon the men, most of whom saw it, as every one watched him coming, thinking he was perhaps the bearer of an order to advance. Every one who has been often under fire with troops knows how much the coolness of individual officers influences those around them ; but a S.O. being mounted, and his approach being always a matter of interest, being generally seen by the majority, he has a greater opportunity of displaying this quality than other officers ; he cannot therefore be too careful about his manner.

As S.Os. are the agents for carrying out the views of those in command, it is essential that before going into action they should be made acquainted with the general outline of the operations to be performed, of where the real attack is to be made, and which are to be the false ones, as they may frequently find themselves in positions where they must take upon themselves the serious duty of interpreting, as it were, the wishes, and of giving expansion to the intentions, of the general in command.

To order movements upon their own responsibility is, indeed, a serious matter, and can only be justified by the extreme urgency of the case. It is a matter of history that Lord Hardinge at the battle of Albuera, when serving as an A.A.G., on his own responsibility directed the movement which won us the day. There is now but little doubt as to our disastrous light cavalry-charge at Balaklava having been ordered by a young S.O. A similar instance occurred at Sabugal, and others might easily be enumerated where either peculiarity of temper or reasoning caused S.Os. to misinterpret the orders they were the messengers of, or where, in default of definite orders, want of judgment led them to originate movements that resulted in failure.

Staff officers assuming such responsibility should have great confidence in their own judgment, based upon experience, and must be prepared to assume all the consequences in case of failure, without claiming for themselves any

great recognition of their services in the event of success, for it must be remembered that the orders they give are in the name of the general commanding.

In conveying a verbal order during a battle or operations executed in presence of an enemy, they cannot be too particular in the first instance in understanding the exact intention, and in afterwards communicating it in a clear, intelligible manner, throwing full light upon the spirit of it, should the recipient be somewhat dull in catching its precise meaning. Staff officers, in such instances, should be respectfully firm in insisting on its being carried out correctly; and having remonstrated in vain in case of any difference of opinion, they should lose no time in galloping back to the C.-in-C. to report the circumstance, so that the affair may be rectified in time.

General officers cannot be too particular in supporting their messengers in such instances, and should be most severe upon commanding officers who fail to obey the orders so conveyed, or who do not pay as much attention to them as if they had been delivered personally by the general himself. Generals who do not lend their staff support in this way, and who will not always back them up, cannot expect to be efficiently served.

It is essential that in many instances S.Os. carrying orders should wait to see them executed, so that when they return to their generals, they can announce not only that the orders have been communicated, but that they have been carried out. In giving orders to their staff for transmission to others, generals should state at what time they should be executed. In such instances, a S.O. should look at his watch immediately on his giving the order, and note the time, also when the movement had been put in execution or completed, as the case might be. It sometimes happens that, before a S.O. bearing an order reaches the division it is intended for, circumstances have changed so as to render its execution no longer applicable or advisable. He ought to take upon himself the responsibility of galloping back for fresh instructions. If there is any doubt in his mind upon the point, he ought to communicate the order to the general for whom it was intended, but informing him at the same time that it was ordered by the C.-in-C., under the impression that the position of affairs was quite different. It will then be for the general to decide as to its execution. Whatever decision he arrives at must be communicated to the officer who bore the order, so that, having galloped at fastest speed back to the C.-in-C., he might inform him of what was done.

Duties after an Action.—A list of all captured guns, property, and prisoners remaining in possession of the division to be made out by the A.A.G., or senior staff officer, and transmitted to the chief of the staff, whose orders are to be taken as to their disposal. The Artillery Staff

should, as soon as possible, make out a general list of the captured ordnance, giving full particulars regarding it. Officers commanding corps to submit to their respective A.A.Gs. a detailed list of killed, wounded, and missing. These returns to be collated into one paper for each division and sent without delay to the chief of the staff, or to the A.G., when there is one. The A.A.G. of each division will make arrangements for the safe custody and provisioning of all prisoners remaining with it: their private property to be strictly respected. The A.Q.M.G. will see to the burial of the dead; if there are any graveyards near, they should be used. When there are large numbers to be buried, trenches 7 feet wide should be dug for the purpose, the bodies being packed in layers as close together as possible, the upper one being at least 2 feet below the natural level, the surplus earth being piled up as a mound over the place. If troops are to be encamped in the neighbourhood, all the lime and charcoal to be had should be used in such burials.

The A.Q.M.G. will see to the formation of the camp or bivouac, and to collecting the several corps in his division that may have been accidentally detached during the day. With an army where the staff is amalgamated all these duties will be carried out under the orders of the senior staff officers of divisions.

Every exertion to be made to clear out the Field Hospitals the day after an action, by sending sick and wounded to the rear. The reserves of ammunition to be replenished, if possible, the very evening of an action.

Intelligence Department.—From the moment that war is declared until peace is made, it is of the utmost importance that we should know what the enemy is doing. A general who has the means of always learning the enemy's movements and intentions, is certain to annihilate an adversary to whom his doings are unknown, all other things being equal. Napoleon said that a general operating in an inhabited country, who was ignorant of the enemy's doings and intentions, was ignorant of his profession; in writing on this subject to his brother in Spain, he said that the single motive of procuring intelligence would be sufficient to authorize detachments of 3,000 or 4,000 men being made to seize local authorities, post-offices, &c., &c. Until the troops are actually in the field, such information must be gleaned by our Intelligence Department in London, and by our Foreign Office people, who should also during the war keep up a system of communication with the enemy's capital, and if possible with his army. The means of starting an intelligence department should, if possible, be taken with you from England, or sent on before you. The purlieus of Leicester Square could supply our armies with spies for every country in Europe.

When war is impending with any country, a number of officers should be sent to travel through it and collect information, although if our Treasury would pay for it, this could be much better done during peace.

Once in the field a knowledge of the enemy's doings must be obtained by the Commander in the best way he can. It is explained further on how reconnaissances for this purpose should be conducted. The other means of obtaining information are prisoners, deserters, by questioning the inhabitants, by intercepted letters, tapping telegraph wires, and by means of spies. The general commanding an army appoints an officer as the chief of his intelligence department, working of course under the chief of the staff, and the utmost care should be taken in the selection. If the army is a large one, one or two other officers should be employed in a similar manner at the head-quarters of corps or divisions that may be at some distance from head-quarters ; it is advisable that the employment of these officers in this manner may be kept strictly secret from the army, and that they should themselves at all times disown having anything to do with spies, and profess utter ignorance of the enemy's movements. It is easy to make them A.D.C.s and let them nominally attend to the general's private correspondence, or to notify their appointments in G.O. as posted to the A.G.'s or Q.M.G.'s department. As in some countries proper officers cannot be found for this purpose who can speak the language, English civilians taken from the consular service may be given this work to do, and be attached to the army professedly as interpreters. Whoever conducts the works should be of middle age, and have a clear insight into human nature, with a logical turn of mind ; nothing sanguine about him, but of a generally calm and distrustful disposition. He should be intimately acquainted with the manners and customs of the people of the country. The organisation of the enemy's army should be engraven on his mind, and the names of all officers commanding corps, divisions, &c., &c., should be in his possession. He should be in constant communication with the central office in London, to whom should be communicated at once all reliable information obtained in the field, and from which in a similar manner all information received from other sources should be transmitted to the chief in the field. The management of spies is difficult; out of every ten employed, you are fortunate if one gives you truthful information. It is important that spies should be unknown to one another. Care should be taken to make each believe that he is the only one employed. Some serve from patriotism, others for money, some receive pay from both sides ; if such an one can be depended upon, he is invaluable. All should be petted and made a great deal of, being liberally paid and large rewards given them when they supply any really valuable information. A few thousand pounds is of no consequence to a nation, but if well laid out in obtaining information, it may be the indirect means of adding to the victories of one's country. It is very necessary that all bonâ-fide spies should always have about their persons some means of proving themselves really to be whom they represent: a certain coin of a certain date, a Bible of a certain edition, a Testament with the

3rd or the 7th leaf torn out, &c., &c. These tokens should be changed frequently. A spy who was employed by an officer in a neutral state, making his way to the head-quarters of the army in the field, could thus at once make himself known to the Intelligence Department there. In some instances, a pass-sign or word is better, as it is less compromising, such as putting up the right hand to the right ear and then to the left ear, &c., &c. The more extensive the system, and the greater its ramifications, both as to the numbers employed and the extent of territory from which information is obtained, the better chances you have of obtaining what you require. It is essential that one or more officers should, if possible, be posted in some neutral state as near the theatre of operation as can be done without exciting suspicion, with whom all the spies and secret agents employed there should be in communication : they should select towns or villages from which there is good telegraphic communication with England, so that the information obtained might be quickly transmitted to our head-quarters in the field. These officers should be provided with ample means to employ spies, and to pay well all those who supply them with trustworthy information. It is very necessary that specially prepared paper should be provided for the use at times of all officers and agents employed in the Intelligence Department, upon which letters can be written in ink that does not become visible until it has been subjected to a certain chemical process. It is necessary that a letter in ordinary ink should invariably be written on the same paper containing the information that it is required to keep secret.

All prisoners taken at the outposts should be led direct to head-quarters without being questioned elsewhere: the chief intelligence officers there will examine each separately, taking care that no one is present. It is much better that the enemy's movements should not be known to the army generally : if they are, they will be canvassed by a host of newspaper correspondents, and in the end the enemy will learn that his doings are known, which will make him more watchful ; whereas it is a great matter to lull him into the pleasing notion that we are a stupid people, without wit or energy enough to find out what he is doing or intending to do, and that we have no spies in his camp. As a nation we are bred up to feel it a disgrace even to succeed by falsehood; the word spy conveys something as repulsive as slave ; we will keep hammering along with the conviction that 'honesty is the best policy,' and that truth always wins in the long run. These pretty little sentences do well for a child's copy-book, but the man who acts upon them in war had better sheathe his sword for ever. Spies are to be found in every class of society, and gold, that mighty lever of men, is powerful enough to unlock secrets that would otherwise remain unknown at the moment. An English general must make up his mind to obtain information as he can, leaving no stone unturned in order to do so. Much will depend on the disposition of the inhabitants ; if they are

friendly, as the Spaniards were during the Peninsular war, it is easy to organise a good intelligence department, for the great difficulty of conveying news from one army to the other is got over ; with good spies in the enemy's camps, they can send their information by a trusty peasant, who of course can pass without suspicion. The letter sent should be written on a strip of very thin paper, which, if rolled up tightly, can be put into a quill 1½ in. long, the ends being sealed up ; this can easily be concealed in the hair, beard, or in a hollow made in the end of a walking-stick. It is a good plan to write secret correspondence in lemon-juice across a newspaper or the pages of a book, which, like a Testament, if found on the person of a peasant, would excite no suspicion. Such writing leaves no mark, but if at any subsequent time it is held to the fire, or a hot iron is passed over it, every letter becomes legible.

In the article on Reconnaissances will be found lists of questions to be put to prisoners, and lists of the ordinary indications of movements on the part of an enemy ; but it is only by studying his manners and customs that one can understand what he means.

In all the wars of this and future ages, the electric telegraph will be greatly used. It must be remembered, that a telegraph operator can, with a small pocket instrument, tap the wires anywhere, and learn the messages passing along them. A few such men living concealed within the enemy's territory could obtain more news than dozens of ordinary spies. Immediately before or during an action an enemy may be deceived to any extent by means of such men : messages can be sent, ordering him to concentrate upon wrong points, or by giving him false information you may induce him to move as you wish. The telegraph was used in all these ways during the American war between North and South. Spies can be made useful in spreading false news of your movements ; indeed a general commanding should so keep his council, that his army, and even the staff round him, should be not only in ignorance of his real intentions, but convinced that he aims at totally different objects from what are his true ones. Without saying so directly, you can lead your army to believe anything : and as a rule, in all civilised nations, what is believed by the army, will very soon be credited by the enemy, having reached him by means of spies, or through the medium of those newly-invented curses to armies—I mean newspaper correspondents.

The intelligence officer (or officers, if there are more than one) should every morning report in writing to his chief the information he has obtained from the officers employed under him, and other sources. All suspicious circumstances observed by the outposts to be reported daily through the general on duty to the Q.M.G., who will at once inform the chief intelligence officer. It is a great object that a system should be established by which all information, whether gleaned from individual

officers out amusing themselves, or from the outposts, or from any other source, should be placed at the disposal of the man to whom the Commander looks for information. All officers should learn, accordingly, that it is their duty to report anything they may discover to the nearest staff officer, who must remember that he must lose no time in informing the Q.M.G. Although trifling events in themselves can tell but little, yet when they are collated in numbers, and compared with the information derived from spies and reconnaissances, each small piece of news becomes, perhaps, an important link in the chain of information.

Police.—No system of police is laid down in our regulations for an army in the field. We must, therefore, be guided by the regulations of foreign armies, and by the establishments that were brought into existence in our Crimean army, up to the date of its leaving for home. An officer of at least the rank of a captain should be named Provost-marshal for a corps of two or three divisions. With a larger force, or if the army is divided, an assistant P.M. will be required.

According to the new organisation lately laid down there is to be a troop of military police attached to each division, and one to the head-quarters of each army corps.

THE PROVOST-MARSHAL is vested by the Articles of War with exceptional powers, and is authorized to inflict summary punishment on any soldier or individual connected with the army whom he may detect in the actual commission of any offence against order and discipline. All ranks are accordingly to afford that officer and his assistants every aid in their power, so long as the authority with which they are trusted is not abused.

Too much care cannot be taken in selecting these officers; they should have a good knowledge of soldiers, be of determined character, and of pleasing manners; severe, but just. It is advisable that they should speak the language of the country: if they do not, interpreters should always accompany them on the line of march, and be permanently attached to them.

As a general rule, the P.M. should encamp with head-quarters; it is advisable that he should be intimately associated with the officer in charge of the Intelligence Department, as both should work hand in hand. If it is possible, indeed, to have one officer as head of both branches, it is all the better. According to our present division of staff duties, the provost-marshal reports and takes his orders from the adjutant-general, whilst the intelligence officers, if not actually on the Q.M.G.'s establishment, would always report to the Q.M.G., and take their instructions from him. With a chief of the staff, both would take their orders direct from him.

As regards a police establishment, it should always be remembered that

we have the very best material in the Irish constabulary to draw upon. It was made use of when the army was first organised in the Crimea, but it was mismanaged, and had no useful result.

The first duty of the P.M. is to make out a list of all those (not soldiers) attached in any capacity, either as servants (public or private), or as sutlers, to the army. In his book each man should have a page, upon which should be noted all particulars regarding him. Men having wives with them, to have their description also entered. To each must be issued a ticket of residence, which, like the passports formerly in general use abroad, should have an exact personal description of the holder, to prevent its being transferred.

Each passport to be numbered, and the number to correspond with the page in the general registry, to which there should be an alphabetical index. The following information should be contained in the passport and registry, to be made out thus :—

TICKET OF RESIDENCE. No. |

Name . . . . . .
Country . . . . . .
Occupation . . . . . .
If a foreigner, has he a passport . . . . . .
Intended residence in camp, &c. . . . . .
Name of any one in camp who will vouch for his respectability . . .
Height . . . . . .
Colour of eyes . . . . . .
Do. hair . . . . . .
Age . . . . . .
Any marks about him . . . . . .
His signature . . . . . .

named above, has permission to remain until further orders.

By command.
(Signed)

Camp (date) of 187 .

The police officer of each division will keep a similar register of all such people following, or belonging to his division, the number of each entry to correspond with that in the general register kept by the P.M. It will be his duty to see that no stranger lives with his division without such a register, and he will arrest any one not possessing one, and take him before a staff officer of his division. It would be a good plan to institute a fine for any remissness in these regulations, or for the loss, by accident or carelessness, of such registry. Of course, if there were grounds for supposing that there was anything criminal in the matter, the offender should be expelled from the theatre of war, or otherwise summarily punished.

Punishments with an army in the field must be summary. It should be remembered that laws which in peace suffice to keep the population of cities in order, will not answer the same purpose in armies during war. The former is an aggregate of men, women, and children, of all ages and all classes, both as regards position and education; the soldiers of an army are, as a general rule, of one class in all respects, are in the prime of youthful manhood, full of fire, passion, and recklessness, and not brought into contact with the softening influences of old men and respectable women; they are men in growth, with the failings and high spirit of the schoolboy. Without strict discipline, such an assemblage would be a mischievous mob and not an army.

The custom and regulations of our service authorize the provost-marshal and his assistant (the latter being a commissioned officer) to inflict summary punishment upon the soldier detected in the actual commission of theft, or other offences militating against good order. Such punishments should be the exception and not the rule, for, unless in cases of peculiar emergency, such as during an action, the assault of a town, or the line of march when in close proximity to the enemy, the ordinary course of military justice ought to be sufficient.

Neither is he ever to interfere (unless called upon by the commanding officer to do so) with offenders when they are with their own officers.

It is not his province to punish upon the evidence of others not his assistants; either he or they should see the crime committed before inflicting summary punishment: this should be the rule, but it may have exceptions.

All camp followers, or individuals of any sort accompanying an army, either for business or pleasure, are to be made amenable to such punishments. On the march the P.M. and his assistants must hover about along the outskirts of the line of march, visiting every village and all large farmhouses, &c., &c., to see that stragglers are not there, as it is by such men that crimes are committed. He should punish stragglers on the spot, and send back soldiers under escort to their respective corps. He must frequently take the orders of the chief of the staff, or A.G., as to the manner in which his punishments are to be carried out. At times particular offences become prevalent, and require immediate examples to be made, &c. The necessities of the case generally are to be judged by the C.-in-C., who will accordingly issue from time to time general orders on the subject of offences that have become of frequent occurrence, and at the same time give instructions privately to the P.M. regarding the punishment to be inflicted. When on the march, all general officers or others in detached commands at some distance from the main body, will aid the P.M. by giving him guards, taking charge of prisoners, giving him patrols (they should, if possible, be cavalry), &c., when he applies for them, unless in their opinion there are sufficiently good military reasons for refusing to

do so. If, under such circumstances, the P.M. considers he has not been properly supported, he must bring the matter to the notice of the chief of the staff, or A.G., who will inquire into it.

When in camp, the P.M. and his assistants must be always on the move, visiting the neighbouring villages, and places at which they think breaches of order and discipline are likely to be committed. He must render every protection in his power to the inhabitants of the country, and be always prepared to inquire into their complaints. This will go far towards encouraging them to bring in provisions for sale. He will take charge of the markets (the positions of which will be, in the first instance, pointed out by the Q.M.G. or staff officer performing his duties). He is responsible for their good order and cleanliness. His police look to the former, and he must obtain fatigue-parties or use defaulters to insure the latter. He will bring to the notice of the staff of divisions any want of cleanliness in the vicinity of their camps, all irregularities at watering-places, &c.

All guards, whether commanded by officers or non-commissioned officers, must take charge of any prisoners handed over to them by the P.M., or any of the police acting under his orders. Those in command of the guards to take down in writing the crime and the name of the police-officer handing the prisoner over. If such prisoners have not been reclaimed previous to the guard being relieved, they must be sent to their regimental guards with a report of the circumstances.

Taking it for granted that the base of our army is a seaport, the town should be under the closest police surveillance. It must have a provost officer, with a sufficient police staff to keep order. He should take his orders from the officer in immediate command as to the individuals to whom passports should be granted to enable them to visit the army in the field. All foreigners must come with regular passports from their own ministers. Travelling gentlemen, newspaper correspondents, and all that race of drones, are an encumbrance to an army; they eat the rations of fighting men, and do no work at all. Their numbers should be restricted as much as possible. Strangers of all sorts, upon arriving at any military post *en route* to join the army, must be at once visited by the P.M., or other officer in police charge, their registers examined, compared with their appearance, and signed by such officer.

It must be remembered that the enemy will do all he can to have paid spies in your camp. No stone should be left unturned to discover them, large rewards being offered to any one who will inform on them.

Courts-martial—are of three classes, namely:—1. General, or Detachment General. 2. District, or Garrison. 3. Regimental, or Detachment.

A Drum-head court-martial is merely one of the above, assembled by proper authority to try an offender at once, and on the spot where the crime had been committed,

so that the punishment may be carried out at once: this is done in extreme cases, such as in mutinous conduct, and when it is desirable to make an example; there must not, however, be any relaxation of the prescribed procedure laid down for the guidance of ordinary Cs.-M.

COMPOSITION AND POWER OF Cs.-M.—1. A general court-martial, if convened in the United Kingdom, the East Indies, Malta, or Gibraltar, shall consist of not less than *nine;* in Nova Scotia or Bermuda, of not less than *seven;* and in any other colony, or in any place beyond our dominions, of not less than *five* commissioned officers, each of whom shall have held a commission for three years before the assembling of the court. No field officer shall be tried by any person under the degree of a captain.

'Any officer commanding any detachment or portion of troops, serving in any place beyond seas, where it may be found impracticable to assemble a general court-martial, upon complaint made to him of any offence committed against the property or person of any inhabitant of or resident in any country in which such troops are so serving, by any person serving with or belonging to our armies, under his immediate command, may assemble a detachment-general court-martial of not less than three commissioned officers of any corps to try any such person, notwithstanding any such officer shall not have received any warrant empowering him to assemble courts-martial.

'A general court-martial may sentence any officer or soldier to suffer death, penal servitude, imprisonment, forfeiture of pay or pension, or any other punishment which shall accord with the usage of the service.

'No sentence of death shall pass without the concurrence of two-thirds at the least of the officers present. No sentence of penal servitude shall be for a period of less than five years; and no sentence of imprisonment shall be for a period longer than two years.

'No court-martial, other than a general court-martial, or a detachment-general court-martial having the same powers as a general court-martial, shall have power to pass any sentence of death or penal servitude.'

2.—'A district or garrison court-martial, if convened in the United Kingdom, the East Indies, Malta, or Gibraltar, shall consist of not less than *seven;* in Nova Scotia or Bermuda, of not less than *five;* and in any other colony or in any place beyond our dominions, of not less than *three* commissioned officers.

'Every district or garrison court-martial may be composed of any officers of different corps, and of officers of our Royal Artillery, and Engineers, and Royal Marines, and of officers of the general staff, whose appointments have been duly notified in general or garrison orders, provided such officers are in the receipt of their full pay on the staff, and are themselves amenable to military law, although on the half-pay of their regimental rank;—or, except for the trial of warrant officers, may be entirely composed of officers of the same regiment, assembled by order of the senior officer on the spot.

'A general, district, or garrison court-martial may sentence any soldier to imprisonment, with or without hard labour, and may also direct that such offender shall be kept in solitary confinement for any portion or portions of such imprisonment, not exceeding fourteen days at a time, nor eighty-four days in any one period of three

hundred and thirty-six days, with intervals between the periods of solitary confinement of not less duration than such periods of solitary confinement;—and when the imprisonment awarded shall exceed eighty-four days, the court shall expressly order that the solitary confinement shall not exceed seven days in any twenty-eight days of the whole imprisonment awarded, with intervals between the periods of solitary confinement of not less duration than such periods.

'Any general, district, or garrison court-martial may, in addition to any other punishment which such court may award, sentence any offender to all or any of the following forfeitures:

To forfeit absolutely or for any period not less than eighteen months any good-conduct badge or any good-conduct pay which such offender may have earned by past service:

To forfeit any annuity, gratuity, medal, or decoration which may have been granted to him:

To forfeit any advantage as to pension which he may have earned by past service:

To forfeit all right to good-conduct pay and to pension on discharge, whether in respect of past or future service:

Such court may also, in addition to any other lawful punishment, sentence any offender to be discharged from the service with ignominy.

3.—REGIMENTAL OR DETACHMENT COURTS-MARTIAL.—'The commissioned officers of every regiment, battalion, or regimental depôt, or of a detachment of ordnance corps, or of the army service corps, commanded by an officer not under the rank of captain, may, by the appointment of their colonel or commanding officer, without other authority than these our rules and articles of war, hold regimental courts-martial, consisting of not less than five officers (unless it be found impracticable to assemble that number, when three shall be sufficient); and may inquire into such disputes or criminal matters as may come before them; and the commanding officer shall in no case be a member of such court.'

A regimental or detachment court-martial may sentence any soldier to imprisonment, with or without hard labour, for any period not exceeding forty-two days, and may also direct that such soldier may be kept in solitary confinement for any portion or portions of such imprisonment, not exceeding fourteen days at a time, with an interval between them of not less duration than such period of solitary confinement; but no sentence shall be executed until the commanding officer shall have confirmed the same; nor shall any sentence of a *detachment* court-martial having the same powers only as a *regimental* court-martial be executed, until the superior officer on the spot, not being a member of the court, shall have confirmed the same.

In addition to any other punishment which the court may award, such a court-martial may further sentence any offender to be put under stoppages of pay until he shall have made good—

Any bounty or free kit fraudulently obtained by him by desertion from his corps and enlisting in some other corps or in the militia:

Any loss or damage occasioned by him in any instance of disgraceful conduct:

Any loss or destruction of, or damage or injury to, any property whatsoever, occasioned by his wilful or negligent misconduct:

Any medal or decoration for service in the field or for general good conduct which may have been granted to him by our order, or any medal or decoration which may have been granted to him by any foreign Power, which medal or medals he may have been authorized to wear, and may have made away with or pawned:

Any loss, destruction, or damage of his horse, arms, clothing, instruments, equipments, accoutrements, or regimental necessaries; or of those of any officer or soldier; or of any extra article of clothing or equipment that he or any other soldier may have been put in possession of and ordered to wear on the recommendation of the surgeon:

Any expense necessarily incurred by his drunkenness or other misconduct.

Except in the case of the loss, destruction, or damage of any arms, clothing, instruments, equipments, accoutrements, or regimental necessaries, in which case the court may by its sentence direct that the said stoppages shall continue till the cost of replacing the same be made good, the amount of any loss, destruction, damage, or expense shall be ascertained by evidence, and the offender shall be placed under stoppages for such an amount only as shall be proved to the satisfaction of the court.

General Remarks.—General courts-martial alone are competent to try commissioned officers, or officers or persons employed under the Secretary for War, or storekeepers and civil officers made subject to the Mutiny Act.

The president of every court-martial shall be appointed by or under the authority of the officer convening such court, and shall in no case be the confirming officer, or the officer whose duty it has been to investigate the charges on which the prisoner is to be arraigned;—nor in the case of a general court-martial, or of a district court-martial for the trial of a warrant officer, under the degree of a field officer, unless a field officer cannot be had;—nor in any case whatever under the degree of a captain, save in the case of a detachment general court-martial, or of a regimental or detachment court-martial holden on the line of march, or on board any transport ship, convict ship, merchant vessel, or troop ship not in commission, or at any place where a captain cannot be had:—

In the case of a detachment general court-martial, the officer convening such court may be the president thereof.

No court-martial shall, for any offence whatever, during a term of peace within the Queen's dominions, have power to sentence any soldier to corporal punishment; provided that any court-martial may sentence any soldier to corporal punishment while on active service in the field, or on board any ship not in commission, for mutiny, insubordination, desertion, drunkenness on duty or on the line of march, disgraceful conduct, or any breach of the Articles of War; and no sentence of corporal punishment shall exceed fifty lashes.

A general, district, or garrison court-martial may, in addition to any sentence of corporal punishment, award imprisonment, with or without hard labour, and with or without solitary confinement.

With a view to regulate and render uniform the procedure of general courts-martial, in respect to addresses to the court from the officer conducting the prosecution and from the prisoner, the following instructions are also to be observed:—

The officer conducting the prosecution is to be allowed an opening address. At the close of the evidence for the prosecution, the deputy judge advocate will ask the prisoner if he intends to adduce evidence. If the prisoner then replies in the negative, the prosecutor will proceed to address the court a second time, for the purpose of summing up his evidence, after which the prisoner may address the court in his defence. At the conclusion of his address, the deputy judge advocate will, in open court, sum up the case to the court.

If, in answer to the deputy judge advocate, the prisoner states that he intends to adduce evidence, he may open his case with an address, before calling his witnesses. At the conclusion of the evidence he may again address the court, after which the prosecutor will be entitled to a reply.

In those special cases where evidence is allowed in reply, the second address of the prisoner is to be made after such evidence, and immediately before the prosecutor's reply.

The address in open court of the deputy judge advocate, summing up the whole case, is to follow the prosecutor's reply.

After the deputy judge advocate has spoken, no other address is to be allowed, and the court will retire to consider its finding.

If any question should arise incidentally during the trial, such as upon the admissibility of evidence, the person, whether prosecutor or prisoner, requesting the opinion of the court, is to speak first: the other person is then to answer, and the first person is to be allowed to reply.

FORM OF RECORDING THE PROCEEDINGS OF A GENERAL COURT-MARTIAL, INCLUDING SOME OF THE MORE UNUSUAL INCIDENTS WHICH MAY OCCUR TO VARY THE ORDINARY COURSE OF PROCEDURE, WITH INSTRUCTIONS FOR THE GUIDANCE OF THE COURT.*

Proceedings of a General Court-Martial, held at _____ on the _____ day of _____ 187__, by order of _____ Commanding _____, dated the _____ day of _____, 187__

PRESIDENT.

_____ _____ _____

MEMBERS.

Rank.	*Name.*	*Regiment.*
_____	_____	_____
_____	_____	_____
_____	_____	_____

_____, Deputy Judge Advocate.

At _____ o'clock the Court opens.

First day. [*No.—Rank—Name—Regiment*] is brought a prisoner before the Court.

The order for convening the Court, and the warrants appointing the President and Deputy [*or*, Officiating] Judge Advocate, are read.

The names of the President and Members of the Court are read over in the hearing of the prisoner, and they severally answer to their names.

Question by the President to the prisoner. Do you object to be tried by me as the President, or by any of the officers whose names you have heard read over?

Answer. Instruction.—*The Questions are to be numbered throughout consecutively in a single series. The letters Q. and A. in the margin may stand for 'Question' and 'Answer' respectively.*

* N.B.—With obvious alterations and omissions, this form is applicable to District or Regimental Courts-martial. For General and District Courts-martial, W.O. Form 642 is to be used.

VARIATIONS.

CHALLENGING PRESIDENT.

Answer.—I object to _____

Question to the Prisoner.—State your objection.

Prisoner.—

The prisoner in support of his objection, requests permission to call _____

_____ is called into Court, and is questioned by the prisoner.

The Court is cleared.

Decision.—The Court, by a majority of two-thirds, disallow the objection. *Or*,

The Court suspend their proceedings, and refer the prisoner's objection to the convening officer.

AT_____o'clock the Court resume their proceedings, and a letter (&c.) is read to the prisoner, marked ___ and attached to the proceedings.

N.B.—*The Judge Advocate cannot be objected to by the prisoner.*

CHALLENGING MEMBER.

Answer.—I object to _____

Question to the Prisoner.—State your objection to _____

Prisoner.—

The prisoner, in support of his objection to _____ requests permission to call _____, &c. &c.

The Court is cleared.

Decision.—The Court disallow the objection.

The Court is re-opened, and the above decision is read to the prisoner.

Decision.—The Court allow the objection.

The President informs _____ that he is not required to serve on this Court-martial.

The Court is re-opened, and the above decision is made known to the prisoner.

New Member.—(*Rank—Name—Regiment*) takes his place as a member of the Court.

Question to Prisoner.—Do you object to be tried by _____ as a member of this Court-martial?

Answer.—_____

(*Any objection is dealt with as in the case of an original member.*)

The President, Members, and Judge Advocate, are duly sworn.

The Prisoner [*No.—Rank—Name—Regiment*] is arraigned upon the following

CHARGE.

Charge.

_____ _____ _____ _____ _____

Question to the prisoner.

Are you guilty or not guilty of the charge against you, which you have heard read?

Answer.

_____

[Instructions.—1. *It is generally advisable that the witnesses be ordered out of Court at this stage of the proceedings.*

2. *All proceedings of the Court, except when it is cleared for deliberation, are to take place in presence of the prisoner.*

3. *No Court-martial shall proceed to trial until they have satisfied themselves of their competence to deal with the charge, both as respects their jurisdiction and the precision with which the charge is worded.*]

VARIATIONS.

1. The prisoner not pleading [refusing to plead] to the above charge, the Court enter a plea of "not guilty."

2. *Plea.*—The prisoner pleads _____ (in bar of trial).

The Court disallow the plea in bar of trial, and require the prisoner to plead to the charge.

Question to the Prisoner.—Have you any evidence to produce in support of your plea?

Answer.—_____

(*Witness examined on oath.*)

The Court are of opinion that the prisoner has not [has] substantiated his plea, and in consequence proceed with the trial [do therefore adjourn until further orders].

Prosecution.

(*Rank—Name—Regiment*) appears as Prosecutor, and reads the following address, which is marked_____, signed by the President, and attached to the proceedings.

[Instructions.—*If possible, no officer who is to be called as a witness is to be appointed to act as Prosecutor. When the Prosecutor is required to give evidence he must be sworn.*]

The Prosecutor proceeds to call witnesses.

First witness for prosecution.

(*Rank—Name—Regiment*) being duly sworn is examined by the Prosecutor.

Q. _____

A. _____

Cross-examined by the Prisoner.

[Instruction.—*Although a prisoner may have a professional adviser near him during the trial, to advise him on all points, and to suggest, in writing, the questions to be put to witnesses, such adviser is not to be permitted to address the Court or to examine witnesses orally.*]

Q. _____

A. _____

Re-examined by the Prosecutor.

Q. _____

A. _____

Examined by the Court.

_____ Q.

_____ A.

The witness withdraws.

[Instruction.—*It is usual to read the whole of a witness's deposition to him before he quits the Court, in order that he may correct any accidental mistake or omission in the recorded minutes. The Court may put questions to witnesses at any stage, but it is preferable to defer them until the examination of the witnesses by the parties to the trial has been concluded.*]

VARIATION.

The prisoner declines cross-examining this witness.

[Instruction.—*In every case where the prisoner does not cross-examine a witness for the prosecution this statement is to be made, in order that it may appear on the face of the proceedings that he has had the opportunity given him of cross-examination.*]

_____ being duly sworn, is examined by the Prosecutor. Second witness for prosecution.

(*The examination, &c., proceeds as above.*)

Instruction.—*There is to be a blank line between the recorded minutes of every two witnesses.*]

At ____ o'clock the Court adjourn until ____ o'clock on the _____

On ____ , the ____ of _____ 187 , at _____ o'clock, the Court re-assemble, pursuant to adjournment, present the same members as on _____ Second day.

VARIATIONS.

(*Rank—Name—Regiment*) being absent. Absent Member.

(*The absence is accounted for.*)

The Judge Advocate produces a medical certificate, which is read, marked ____ , and attached to the proceedings.

The Court adjourn until ____ .

The Court being below the number required or, by the Mutiny Act, adjourn until further orders;

There being present (*not less than the least number required by the Mutiny Act*) members, the trial is proceeded with.

A warrant is read, bearing date _____ , appointing (*the senior member*) President of the Court-martial in the place of _____ who _____ New President.

The trial is proceeded with.

A warrant is read, bearing date _____ , appointing _____ to act Judge Advocate in the place of _____ , who _____ New Judge Advocate.

_____ is duly sworn.

The trial is proceeded with.

[Instruction.—*No proceedings can take place in the absence of either President or Judge Advocate.*]

Examination [cross-examination] of _____ continued.

Do you intend to call any witness in your defence?

Yes.

[Instruction.—*If the prisoner replies in the negative, for the course to be pursued, see General Remarks.*]

The prosecution is closed.

DEFENCE.

The prisoner having been called upon to make his defence, says: _____ _____ [*or* requests to be allowed _____ days to prepare his defence.]

First witness for defence.

The prisoner calls the following witnesses.

(*Rank—Name—Regiment*) is duly sworn.

Examined by the Prisoner.

Q. _____

A. _____

Cross-examined by the Prosecutor.

Q. _____

A. _____

Re-examined by the Prisoner.

Q. _____

A. _____

Examined by the Court.

Q. _____

A. _____

The witness withdraws.

Close of the defence.

The prisoner reads an address, which is marked _____, signed by the President, and attached to the proceedings.

[Instruction.—*If necessary the Court may now be adjourned to enable the Prosecutor to prepare his reply; the fact of adjournment being recorded as before.*]

Reply.

The Prosecutor reads the reply, marked _____, which is signed by the President, and annexed to the proceedings.

[*Or* the Prosecutor declines making a reply.]

The Court adjourn until _____ to enable the Deputy Judge Advocate to prepare his summing up.

th day. Summing up.

The Court re-assemble on _____, and the prisoner being present, the Deputy Judge Advocate reads the summing up, which is marked _____, signed by the President, and attached to the proceedings.

The Court is cleared for the purpose of considering the Finding.

FINDING.

Finding. Not guilty.

The Court find that the prisoner (*No.—Rank—Name—Regiment*) is not guilty of the charge;

or,

is guilty of the charge [all the charges]. Guilty.

or,

is guilty of the first charge and guilty of the second charge, with the exception of_____

or,

is not guilty of desertion, but is guilty of absence without leave.]

[Instruction.—*In all cases when the Court acquit the prisoner, the Finding is to be recorded in simple terms 'Not Guilty.' If on the trial of a commissioned officer they desire to acquit the prisoner honourably, they are to state so in a separate letter.*]

PROCEEDINGS BEFORE SENTENCE.

The Court being re-opened, the prisoner is again brought before it.

(*Rank—Name—Regiment*) is duly sworn.

What record have you to produce in proof of former convictions against the prisoner? Question by the President.

I produce a verified extract from _____ [*or*, There are none.] Answer.

[*See form at the end of this Appendix.*]

This document being read, compared with the original, and found correct, is marked_____, signed by the President, and attached to the proceedings.

Instruction.—*In cases of drunkenness, evidence of former acts is to be given as follows:*

On reference to the_____ defaulters' book now laid before the Court, it appears that the prisoner's name has been recorded therein for the crime of drunkenness_____ times since his enlistment.

N.B.—This evidence can be given from the regimental, company, battery, or other defaulters' book.

Is the prisoner under any sentence at the present time? Q.

_____ A.

What is the prisoner's general character? Q.

_____ A.

What is his age? Q.

_____ A.

What is the date of his attestation? Q.

_____ A.

What service is he allowed to reckon towards discharge? Q.

_____ A.

Is the prisoner in possession of any decorations or honorary rewards? Q.

_____ A.

[Instruction.—*In a case of desertion it is to be asked and recorded, whether the prisoner surrendered or was apprehended.*]

The Court is again cleared.

SENTENCE.

Sentence. The Court sentence the prisoner (*No.—Rank—Name—Regiment*).

[Instruction.—*The sentence is to be marginally noted in every case.*]

Death. *a.* to suffer death by being shot [hanged].

Penal servitude — years. *b.* to suffer penal servitude for the term of_____ years [*or* for life].

Cashiered. *c.* to be cashiered.

Fined —*s.*— *d.* *d.* to be fined_____*s.*_____ *d.*

Reduction. *e.* to be reduced to the ranks.

[Instruction.—*This implies reduction of a non-commissioned officer to gunner, driver, sapper, or private, as the case may be. The direction to cease to do duty as an acting bombardier or lance corporal is to form no part of the sentence of the Court.*

Impt. H. L. for — days. *f.* to be imprisoned with hard labour [with such labour as, in the opinion of the medical officer of the prison, he may be equal to] for_____days.

84 days' impt. H. L. and S. C. *g.* to be imprisoned for eighty-four days, forty-two of the said eighty-four days to be solitary confinement, such solitary confinement not to exceed fourteen days at a time, with intervals between the periods of solitary confinement of not less duration than such periods, the remainder of the imprisonment to be with hard labour (*or as in f.*).

[*N.B.—In the foregoing the maximum of solitary confinement is given.*]

— days' impt. H. L. and S. C. *h.** to be imprisoned for_____days,_____of the said_____days to be solitary confinement, such solitary confinement not to exceed seven days in any twenty-eight days, with intervals between the periods of solitary confinement of not less duration than such periods, the remainder of the imprisonment to be with hard labour (*or as in f.*).

Stoppages. *i.* to be put under stoppages of pay until he shall have made good the following articles, viz.: _____ [or until he shall have made good the sum of_____, *as the case may be*], *vide Articles of War*, 130, 131.

— lashes. *j.* to suffer a corporal punishment of_____lashes, and to be imprisoned, &c., &c. (*as in f. g. or h.*).

Forfeiture of pension, good-conduct pay, medals, &c. *k.* 'To forfeit absolutely (*or for any period not less than eighteen months, as the case may be*)—good-conduct badge (or badges), and pay which he has earned by past service.

(*N.B.—Number of badges to be specified.*)

or,

'To forfeit the annuity [gratuity, medal, or decoration, *here specify each*] which has been granted to him.

or,

'To forfeit all or any advantage as to pension which he has earned by past service.

or,

'To forfeit all right to good-conduct pay, and to pension on discharge, whether in respect of past or future service.'

* When the imprisonment awarded exceeded 84 days.

(*N.B.—In accordance with the* 117*th Art. of War, an offender may be sentenced to all or any of these forfeitures.*)

l. The Court do further sentence him to be discharged with ignominy from Her Majesty's service. Discharge with ignominy.

Signed at_____, this_____ day of_____ 187__

(*Signature.*) (*Signature.*)

Judge Advocate. President.

[Instruction.—*Space of at least half a page is to be left for the remarks of the confirming officer.*]

Confirmed.

or,

[I confirm the finding and sentence of the Court, but [mitigate] remit _____]

(*Date.*) (*Signature of confirming authority.*)

I hereby approve [As Civil Governor I further approve] the sentence of the Court upon (*No. rank and name of prisoner*) on behalf of Her Majesty.

(*Date.*) (*Signature of Civil Governor.*)

(*N.B.—This approval on behalf of Her Majesty is equally necessary to the carrying into effect of a capital sentence in those cases where the confirming authority also administers the civil government.*)

REVISION.

On_____, the_____ day of_____, at _____ o'clock, the Court re-assemble by order of_____for the purpose of reconsidering their_____.

Present the same members as before.

The letter [order *or* memorandum] containing the instructions to the Court and the reasons of the revising authority for requiring a revision of the finding (*or* sentence) is read, marked_____ signed by the President, and attached to the proceedings.

The Court having attentively considered the observations of the revising officer and the whole of the proceedings, Revised finding.

a. do now revoke their former finding, and are of opinion, &c.,

or,

b. do now revoke their former sentence, and now sentence the prisoner, &c., &c., Revised sentence.

or,

c. do now revoke their former finding and sentence. The Court are now of opinion, &c., &c. Revised finding.

d. do now respectfully adhere to their former sentence [finding and sentence]. Revised sentence.

Signed at_____, this_____ day of_____187___.

_____ _____

(Judge Advocate.) (President.)

[Instruction.—*No additional evidence for prosecution or defence can be received on the revision, and no portion of the original minutes can be altered. When any alteration is made in the finding, it is absolutely necessary that the sentence shall be given afresh,—it is not sufficient for the Court to state that they adhere to their former sentence in such cases.*]

Recommendation to mercy, &c.

[*Instruction.*—When the Court have passed judgment, and desire to recommend the prisoner to the favourable [merciful] consideration of the confirming authority; or to remark on the conduct of the parties before them; or on the manner in which a particular witness has delivered his testimony, &c., &c., they are to embody their views in a separate letter, to be signed by the President, and forwarded with the proceedings to the confirming authority, or to the Judge Advocate General, as the case may be.]

FORM OF CERTIFICATE OF PREVIOUS CONVICTIONS.

Certified copy of an entry [*or* entries] of the previous Convictions by Courts-martial [*or* by Civil Court] of No. , A.B., of the , taken from the Court-martial Book [*or* Regimental, *or* Company's Defaulters' Book, *as the case may be,*] of the Regiment.

Description of Court-martial by which tried.	Place and Date of Trial.	Charges upon which tried.	Finding and Sentence of the Court.	Minute of Confirmation.	Sentence, whether inflicted or remitted.

Authenticated by . . . . . (*here the signature of the officer, certifying to the correctness of the extract, is to be given*). . . . .

Dated at

this day of , 18 .

(*To be signed by the President and attached to the proceedings.*)

FORMS OF CHARGES.

THE FOLLOWING FORMS OF CHARGES ARE TO BE USED AS OCCASION MAY REQUIRE, IN ARRAIGNING PRISONERS BEFORE A COURT-MARTIAL.

N.B.—The marginal references apply to the Articles of War for the year 1874.

MUTINY.

1. Having on the 187 at begun [excited, caused, *or* joined in, *as the case may be*] a mutiny in the regiment. 15th Cl. M. Act. 36th Art. of War.

or,

2. Having, on the 187 at when present at a mutiny taking place in the regiment, not used his utmost endeavour to suppress the said mutiny.

or,

3. Having at come to the knowledge of a mutiny [*or* an intended mutiny, *as the case may be*] in the regiment, and not having [without delay] given information thereof to his commanding officer.

or,

4. Having, on the , at , conspired with to mutiny.

INSUBORDINATION.

5. STRIKING A SUPERIOR OFFICER.

Insubordination, accompanied with personal violence, in having at on the struck [with his clenched fist, *or* open hand, *or* missile, *or* weapon, *as the case may be*] of the the said being his superior officer, and being in the execution of his office. 15th Cl. M. Act. 37th Art. of War.

or,

6. USING OR OFFERING VIOLENCE AGAINST A SUPERIOR OFFICER.

Insubordination, accompanied with personal violence, in having at on the offered [*or* used, *as the case may be*] violence against , by [*here state the precise nature of the violence used or offered*], the said being his superior officer, and being in the execution of his office.*

7. DISOBEYING THE COMMAND OF A SUPERIOR OFFICER.

Insubordination, in having at on the disobeyed the lawful command of his superior officer, by [*here describe the precise nature of the act of disobedience imputed to the prisoner*]. 38th Art. of War.

8. USING THREATENING LANGUAGE TO A SUPERIOR.

N.B.—If insubordinate language accompany the act or acts of violence, it should not form the subject of a separate charge, but be stated as a circumstance in the charge alleging the violence: it is essential that the precise language

* By the words 'Offer of violence,' is implied any threatening act or gesture amounting to an attempt to use violence.

used should be specified in the charge; and if accompanied by gesture the same should be accurately described.

41st Art. of War. Insubordination, in having at on the used threatening language towards his superior officer, in substance and to the effect following, that is to say, 'I will take away your life.'

DESERTION AND ABSENCE WITHOUT LEAVE.

9. DESERTION.

42nd Art. of War. (1st Cl.) 1st. Having deserted* from the regiment at on the

N.B.—If the prisoner made away with any of his regimental clothing, appointments, or necessaries, it should form the subject of a second charge, viz.—

102nd Art. of War. 2nd. Having at the time stated in the first charge made away with the following articles of his kit, viz.—

[*Here specify the different articles deficient, and in the case of a great-coat, its estimated value.*]

[*Instruction.*—Attention is called to the mode in which charges for making away with, or losing through neglect, articles of clothing, &c., should be framed.

II. In cases where it is considered necessary to charge the prisoner with the above crime, care must be taken that a separate charge should contain each averment; for instance—

1st charge. 'Having at on the made away with the following articles,' &c.

2nd charge. 'Having at on the lost by neglect the following articles,' &c.

3rd charge. 'Having at on the sold the following articles,' &c.

III. It would be competent for the Court to find the prisoner 'guilty' of one of the alternative charges, and to acquit him of the remainder; but if the several averments are embodied in one charge, the Court cannot legally convict on that charge.

IV. These instructions are applicable to all cases where an alternative charge is deemed necessary.]

N.B.—If the prisoner re-enlisted in another corps and obtained bounty, a charge should be added as follows:—

3rd. Having whilst in a state of desertion from the , as stated in the first charge, enlisted into the on the , and having by such enlistment fraudulently obtained a bounty of , and also a free kit, value

* Evidence should be given to the Court of the period of absence, of the surrender or apprehension of the prisoner, and other circumstances bearing upon the degree of his offence.

10. ADVISING OR PERSUADING OTHERS TO DESERT.

Having at , on the [*or* between the and], advised [*or* persuaded, *as the case may be*] private , of the regiment to desert from Her Majesty's service, by having in conversation with the said private said to him [*here state the acts done or the words used by the way of advice or persuasion*]. 44th Art. of War.

11. KNOWINGLY RECEIVING AND ENTERTAINING A DESSRTER.

Having at on the received and entertained of the knowing him to be a deserter, and not having immediately given notice to the proper authority, with a view to cause the said to be apprehended. 46th of W

12. FRAUDULENT CONFESSION OF DESERTION BY A SOLDIER WHILE SERVING.

Having at , on the made a false statement to his commanding officer, by fraudulently confessing himself to be a deserter from the regiment. 46th Art. of War.

13. ABSENCE WITHOUT LEAVE.

Having at , on the without leave from his commanding officer, absented himself from the regiment, and having remained so absent until the 50th Art. of War.

OFFENCES IN THE FIELD, CAMP, GARRISON, OR QUARTERS.

14. SLEEPING ON A POST.

Sleeping on his post when sentry over , at [*station*], between the hours of and o'clock on the 57th Art. of War.

(*Name of the post or guard should be stated.*)

15. LEAVING A POST BEFORE BEING RELIEVED.

Having, before being regularly relieved, left his post when sentry over (*post or guard to be here stated*), at [*station*], between the hours of and o'clock, on the 57th Art. of War.

16. LEAVING A GUARD OR PIQUET.

Having, on the , left his guard [*or* piquet, *or* post, *as the case may be*] a without having first obtained leave from the officer [*or* non-commissioned officer] in command of the said guard [*or* piquet, *or* post], and for not having returned until 65th Art. of War.

[*N.B.—If the offender should not return to his guard or piquet before it is relieved, the latter part of the charge to be worded accordingly.*]

17. BREAKING ARREST OR ESCAPING FROM CONFINEMENT.

Having at , on the , whilst under arrest [*or* a prisoner in confinement, *as the case may be*] in the [*here specify the place in which he was confined*], broken his arrest [*or* escaped from such confinement, *as the case may be*], before he was set at liberty by proper authority. 69th Art. of War.

18. ABSENCE FROM PARADE.

70th Art. of War. Having at , on the , failed to appear at , the place of parade appointed by his commanding officer.

19. A COMMANDER OF A GUARD, PIQUET, OR PATROL, SUFFERING A PRISONER COMMITTED TO HIS CHARGE TO ESCAPE.

73rd Art. of War. Having, when in command of [*here state whether a* guard, piquet, *or* patrol], at , on the , negligently [*or* wilfully, *as the case may be*] suffered , a prisoner committed to his charge to escape (*or* released him without proper authority, *as the case may be*).

DRUNKENNESS.

20. DRUNK ON DUTY.

Having, on the been drunk when on duty, when on the guard at [*or* on piquet, *or* when employed as mounted orderly, *or* on escort duty, *as the case may be*].

N.B.—The name of the guard should always be stated; and if the prisoner was on *sentry* at the time, the particular post should be inserted in the charge.

21. DRUNKENNESS.

77th Art. of War. Having, at , on the , been drunk.

N.B.—In accordance with the 78th Article of War, a non-commissioned officer can be tried by a regimental or detachment court-martial for an act of drunkenness *not on duty*, but a soldier can only be brought to trial for this offence before a district or garrison court-martial.

DISGRACEFUL CONDUCT.

22. FRAUDULENTLY MISAPPLYING PUBLIC MONEY OR STORES.

80th Art. of War. Disgraceful conduct in having at , on the , fraudulently misapplied—

a. the sum of , being public money entrusted to him by for the purpose of [*here state the facts fully.*]

[N.B.—This is applicable to a pay-sergeant making away with money entrusted to him for the payment of his troop, battery, or company.]

b. the following property [*or stores*] belonging to Government, viz. [*here state the property and its value*].

24. MALINGERING AND FEIGNING DISEASE.

81st Art. of War. Disgraceful conduct at , on the , in malingering [*feigning or producing disease or infirmity, or wilfully doing any act, or wilfully disobeying any orders, thereby producing or aggravating disease or infirmity, or delaying his cure, as the case may be*].

[N.B.—In each case the acts done or omitted to be done, from whence the Court are to draw the inference that he malingered, &c., &c., should be specified.]

24. WILFULLY MAIMING OR MUTILATING.

Disgraceful conduct in having at , on the , wilfully maimed [*or* injured] himself, by discharging a loaded musket through his wrist [*or* inflicting a wound with , *as the case may be*], with intent thereby to render himself unfit for Her Majesty's service. 81st Art. of War.

or,

25. MAIMING OR INJURING ANOTHER SOLDIER.

Disgraceful conduct in having at , on the , wilfully maimed [*or* injured] Private , by discharging a loaded musket through the wrist of him, the said Private [*or* inflicting a wound with , *as the case may be*] with intent thereby to render him, the said Private unfit for Her Majesty's service.

26. TAMPERING WITH EYES.

Disgraceful conduct, in having at , on the , tampered with his eyes by [*describe the nature of the act supposed to have been done by the prisoner*], with intent thereby to render himself unfit for service. 81st Art. of War.

27. STEALING OR FELONIOUSLY RECEIVING.

a. Disgraceful conduct, in having at , on the , stolen the following property, belonging to , viz. [*here describe the articles and their value*]. 81st Art. of War.

or,

b. Disgraceful conduct, in having at , on the , feloniously received the following articles, the property of , knowing the same to have been stolen, viz. [*here describe the articles and their value*].

[*N.B.—Both these charges are to be used in the cases where a soldier is found in possession of stolen property, and it is not certain that he committed the theft.*]

28. OFFENCE OF A FELONIOUS OR FRAUDULENT NATURE UPON A CIVILIAN.

Disgraceful conduct, in having at , on the , fraudulently obtained from , a civilian, the sum of [*or* goods amounting to , *as the case may be*], by 81st Art. of War.

[Here state the precise nature of the trick or pretence by means of which the money or goods was or were obtained.]

29. INDECENT ASSAULT.

Disgraceful conduct, in having at , on the , committed an indecent assault upon 81st Art. of War.

30. PRODUCING FALSE OR FRAUDULENT ACCOUNTS OR RETURNS.

Disgraceful conduct, in having on the , at in his capacity of sergeant-major [quartermaster sergeant, pay-sergeant, *or*, pay-corporal, *as the case may be*], with intent to defraud, produced to the 88th Art. of War.

paymaster [adjutant, *or other officer, as the case may be*] certain false certificates [*or* vouchers, *or* accounts], as follows :—

[Here specify the particular nature and description of the certificates, or vouchers, or accounts produced.]

MISCELLANEOUS OFFENCES.

31. MAKING AWAY WITH, ETC., ARMS, CLOTHING, INSTRUMENTS, EQUIPMENTS, ACCOUTREMENTS, OR NECESSARIES.

102nd Art. of War. Having at , on the , made away with [pawned, sold, lost by neglect, wilfully spoiled, *as the case may be*] the following articles, viz.:—

[Here specify the different articles in detail, and the value of each, with the exceptions provided by the 131st Article of War.]

N.B.—*See Instructions in Form* No. 9.

32. WRITING AN ANONYMOUS LETTER TO A SUPERIOR.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , written and sent to [A. B.] his superior officer an anonymous letter, which letter contained the following passage [*to be set out in words ; if no particular passage can be selected, the whole letter should be set out*].

33. OBSTRUCTING AND ASSAULTING THE POLICE IN THE EXECUTION OF THEIR DUTY.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having, at , on the , assisted [soldiers *or* civilians, *as the case may be*] in obstructing and assaulting constables and , in the execution of their duty.

[*N.B.—The particulars in every case are to be distinctly specified. If the prisoner actually joined the party he is to be charged with the actual assault and obstruction, whether he was guilty of any violence or not.*]

34. FORCING OR STRIKING A SENTINEL.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , wilfully struck Private , he being at the time sentry on duty (*or for having forced a sentry as the case may be*).

35. A NON-COMMISSIONED OFFICER ALLOWING A PRISONER IN HIS CHARGE TO GET DRUNK.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , when sergeant [*or* corporal] of the guard, wilfully [*or* through neglect] allowed Private to get drunk when a prisoner under his charge.

36. A SENTRY NEGLECTING TO OBEY THE ORDERS OF HIS POST.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , when on sentry at No. post of guard,

wilfully [*or* by neglect, *as the case may be*] allowed (*here state the particular fact*), thereby neglecting to obey the orders of his post.

37. IRREGULAR CONDUCT ON GUARD.

Conduct to the prejudice of good order and military discipline— 105th Art. of War.

a. In having at , on the , when on sentry at No. post of guard, delivered over his charge to Private , without a non-commissioned officer being present at the relief (*or* in having, &c. &c., when on guard, relieved Private , who was on sentry at , without being regularly posted at such relief by a regular non-commissioned officer of the guard).

or,

b. In having, when corporal of the guard, at , on the , wilfully permitted Private , one of the guard, to relieve Private , who was then on sentry at No. post, without him, the prisoner, being present at the relief.

38. DRUNK AND RIOTOUS.

Conduct to the prejudice of good order and military discipline—

a. In having been drunk and riotous in the streets [*or* barracks, *as the case may be*] at , on the , and for resisting and offering violence to the piquet ordered to take him into confinement. 105th Art. of War.

or,

b. In having been drunk and riotous in the streets at , on the and for having drawn [*or* attempted to draw] his bayonet upon .

39. BREAKING OUT OF BARRACKS AFTER TATTOO.

Conduct to the prejudice of good order and military discipline, in breaking out of barracks, after tattoo, at , on the , and remaining absent until the . 105th Art. of War.

40. BREAKING OUT OF BARRACKS WHEN CONFINED THERETO.

Conduct to the prejudice of good order and military discipline, in breaking out of barracks when confined thereto, at , on the , and remaining absent until the . 105th Art. of War.

41. PREFERRING FRIVOLOUS AND UNFOUNDED COMPLAINTS AS TO THE QUALITY OF PROVISIONS OR NECESSARIES.

Conduct to the prejudice of good order and military discipline, in having at , on the , wilfully preferred a frivolous and unfounded complaint by saying [*the complaint to be here stated in terms*]. 105th Art. of War.

42. FIRING OFF A MUSKET LOADED WITH BALL IN HIS BARRACK ROOM.

Conduct to the prejudice of good order and military discipline, in having at on the , fired off in his barrack room, a musket loaded with powder and ball, thereby endangering the lives of other soldiers,

and wantonly expending a round of the service ammunition entrusted to his charge, and further causing barrack damage to the amount of .

43. MILITARY WITNESS REFUSING TO BE SWORN.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , when in attendance as a witness at a court-martial, held for the trial of , unlawfully refused to be sworn, in order to give his evidence.

44. MILITARY WITNESS REFUSING TO GIVE EVIDENCE.

105th Art. of War. Conduct to the prejudice of good order and military discipline, in having at , on the , after being duly sworn as a witness before a court-martial, then sitting for the trial of , unlawfully refused to [*here state the nature of the refusal, whether to give evidence, or to answer questions, or both, as the case may be*].

45. PERJURY.

35th Art. of War. Perjury, in having at , on , when sworn and examined as a witness before a court-martial then being held for the trial of , wilfully and corruptly made the following statement material to the question then at issue before the said Court [*here set out the words used*]; the said statement being false, as he, the prisoner, well knew.

46. ATTEMPT TO COMMIT SUICIDE.

104th Art. of War. Having at , on the , attempted to commit suicide, by [*here state the precise nature of the offence*].

PART II.

COMPOSITION AND DISTRIBUTION OF AN ARMY.—The army is to be divided into army corps, consisting each of 22,386 (21 battalions) infantry, 3733 cavalry (6 regiments), 90 guns, with a proportion of engineers, &c., &c., &c. (these numbers do not include officers), the detail being as follows*:—

A BRIGADE OF CAVALRY.

—	Officers.	N. C. Officers and Men.	All Ranks.	Horses.				Guns.	General Service & Forge Waggons.	Carts, S.A., &c.
				Officer's Chargers.	Troop.	Transport.	Total.			
Staff	3	1	4	11	..	..	11	..	..	..
3 Regiments	81	1869	1950	237	1440	135	1812	..	33	..
1 Battery, Horse Artillery	7	172	179	15	164	..	179	6	3	..
Control Department	2	26	28	3	..	26	29	..	5	3
Medical "	..	..	..	..	..	..	..	..	..	..
Veterinary "	2	3	5	4	..	..	4	..	..	..
Chaplain's "	1	1	2	1	..	..	1	..	..	..
Total	96	2072	2168	271	1604	161	2036	6	41†	3

A BRIGADE OF INFANTRY.

Staff	3	1	4	11	..	..	11	..	..	..
3 Battalions	93	3198	3291	30	..	147	177	..	15	36
Control Department	1	26	27	2	..	32	34	..	7	2
Medical "	..	..	..	..	..	..	..	..	..	..
Veterinary "	..	..	..	..	..	..	..	..	..	..
Chaplain's "	1	1	2	1	..	..	1	..	..	..
Total	98	3226	3324	44	..	179	223	..	22†	38

* Allowing for the men to be used for regimental transport purposes, each battalion of infantry should be counted as 1000 bayonets; and as there are only 480 troop horses in each cavalry regiment (not counting officers' chargers), each regiment of cavalry should be counted only as 500 sabres. If these numbers are taken the total infantry would be 21,000, and the total of the cavalry would be 3000.

† *These numbers include the waggons in 'Second Line' of Transport, containing tents, horse blankets, &c.*

A DIVISION OF INFANTRY.

—	Officers.	N. C. Officers and Men.	All Ranks.	Horses.				Guns.	General Service & Forge Waggons.	Carts, S.A., &c.
				Officer's Chargers,	Troop.	Transport.	Total.			
Staff	10	6	16	31	..	..	31	..	..	..
2 Brigades of Infantry (6 battalions) and Staff . .	196	6,452	6,648	88	..	358	446	..	44	76
1 Battalion of Rifles . . .	21	1,066	1,097	10	..	49	59	..	5	12
1 Regiment of Cavalry . .	27	623	650	79	480	45	604	..	11	..
3 Batteries of Field Artillery (1, 9-pr., 2, 16-pr. batteries)	21	547	568	24	412	..	436	18	9	..
1 Company Royal Engineers .	6	186	192	11	36	..	47	..	6	..
1 Troop Military Police . .	2	73	75	4	65	6	75	..	2	..
1 Infantry and Artillery Reserve Ammunition Column	6	206	212	7	246	..	253	..	16	29
Control Department . . .	10	113	123	16	..	114	130	..	24	9
Medical ,, . . .	..	..	..	..	..	..	..	..	..	..
Veterinary ,, . . .	2	21	23	4	..	..	4	..	..	..
Chaplain's ,, . . .	2	2	4	2	..	..	2	..	..	..
Total	313	9,295	9,608	276	1,239	572	2,087	18	117*	126

AN ARMY CORPS.

Staff	19	12	31	67	..	..	67	..	..	..
3 Divisions of Infantry . .	939	27,885	28,824	828	3717	1716	6,261	54	351	281
1 Brigade of Cavalry . . .	96	2,072	2,168	271	1604	161	2,036	6	41	3
Artillery:—										
Reserve	..	..	..	..	..	..	..	..	..	..
Regimental Staff . . .	4	2	6	11	..	..	11	..	..	..
3 Batteries, Horse Artillery	21	516	537	45	492	..	537	18	9	..
2 Field batteries (16-prs.) .	14	382	396	16	292	..	308	12	6	..
Army Corps Ammunition Reserve, in 3 divisions	18	516	534	21	528	..	549	..	99	..
Engineers:—										
Regimental Staff . . .	2	1	3	5	..	..	5	..	..	..
1 Company, and Field Park	7	209	216	12	9	70	91	..	3	..
1 Pontoon Troop . . .	9	313	322	18	228	..	246	..	..	..
½ Telegraph Troop . . .	6	143	149	12	90	..	102	..	..	..
1 Troop Military Police . .	2	73	75	4	65	6	75	..	2	..
Control Department . . .	27	277	304	50	..	164	214	..	16	5
Medical ,, . . .	..	..	..	..	..	..	..	..	..	..
Veterinary ,, . . .	45	393	438	52	..	..	52	..	..	..
Chaplain's ,, . . .	3	3	6	3	..	..	3	..	..	..
Bakery Train	2	218	272	..	..	201	201	..	5	5
Butchery Train		52								
Total	1,214	33,067	34,281	1414	7025	2318	10,758	90	532*	294

See note on previous page.

THE FOLLOWING TABLE SHOWS THE SAME ARMY CORPS, THE NUMBERS BEING ARRANGED SO AS TO SHOW MORE CLEARLY THE PROPORTIONS OF EACH ARM OF THE SERVICE.

—	Officers.		Non-Commissioned Officers and Men.	All Ranks.	Horses.	Guns.
	Combatant.	Non-Combatant.				
Staff and Departments.						
Army Corps	19	77	955	1,051	537	..
3 Infantry Divisions	30	42	426	492	501	..
1 Cavalry Brigade	3	5	31	39	45	..
6 Infantry Brigades	18	12	168	198	276	..
Total Staff	70	136	1,580	1,786	1,359	..
	206					
Infantry.						
21 Battalions	588	63	22,386	23,037	1,239	..
	651					
Cavalry.						
3 Regiments attached to Infantry Divisions	69	12	1,869	1,950	1,812	..
1 Brigade (3 Regiments)	69	12	1,869	1,950	1,812	..
Total Cavalry	138	24	3,738	3,900	3,624	..
	162					
Artillery.						
Regimental Staff	4	..	2	6	11	..
Horse Artillery: 1 Battery, attached to Cavalry Brigade	5	2	172	179	179	6
Horse Artillery: 3 Batteries in Reserve	15	6	516	537	537	18
Field Artillery: 9 Batteries, attached to Infantry Divisions	45	18	1,641	1,704	1,308	54
Field Artillery: 2 Batteries in Reserve	10	4	382	396	308	12
3 Infantry and Artillery Reserve Ammunition Columns	9	9	618	636	759	..
1 Army Corps Ammunition Reserve	9	9	516	534	549	..
Total Artillery	97	48	3,847	3,992	3,651	90
	145					
Engineers.						
3 Companies, attached to Infantry Divisions	15	3	558	576	141	..
Regimental Staff	2	..	1	3	5	..
1 Company, and Field Park, in Reserve	6	1	209	216	91	..
1 Troop, Pontoon Train	9	..	313	322	246	..
½ Telegraph Troop	6	..	143	149	102	..
Total Engineers	38	4	1,224	1,266	585	..
	42					
Military Police.						
3 Troops, attached to Infantry Divisions	6	..	219	225	225	..
1 Troop attached to Head Quarters	2	..	73	75	75	..
Grand Total of Army Corps	939	275	33,067	34,281	10,758	90
	1214					

In distributing regiments into brigades and divisions, they should be grouped as much as possible according to regimental distinctions, the Fusiliers being together, the Light Infantry the same, and so on.

It is advisable that the divisions should be numbered 1, 2, 3, 4, &c., right through the army: thus in an army consisting of three army corps, the second army corps would consist of the 4th, 5th, and 6th divisions of infantry. The brigades of cavalry should be similarly numbered. The brigades of infantry should be called right and left brigades of such and such a division.

CAVALRY.—The proportion of cavalry in an army corps is $\frac{1}{6}$th of the infantry. If the units are counted as stated in note on page 119, the proportion would be $\frac{1}{7}$th of cavalry (in foreign armies it is about the same). The nature of the service upon which an army is sent, and the character of the country to be operated in must always greatly influence their proportion.

In open countries where forage is plentiful, one cannot have too many cavalry (provided they can fight on foot as well as mounted); and even in the closest countries, if forage is to be had, the more mounted men (whether you call them cavalry or mounted infantry it matters little) you have, the more formidable will be your army. A brigade of cavalry armed with breech-loaders that have a range of 800 yards, might go anywhere, even into the closest country, by dismounting $\frac{2}{3}$rds of their numbers; with a strong force of cavalry one might do wonders during a campaign or an action, by cutting in upon an enemy's flanks, rear, communications, &c. For a pursuit they would be invaluable; but then they must make up their minds to fight on foot whenever required to do so.

Except in the East, there is now scarcely any inhabited country where masses of cavalry can act as in days gone by; this fact, and the increased precision and range of small arms, making it almost impossible to screen large bodies of cavalry from infantry fire, has caused all European armies to have a regiment of cavalry attached to each division, and to relinquish those great corps of that arm so much in favour with the first Napoleon.

ARTILLERY.—The proportion of guns to sabres and bayonets in an army corps is as nearly as possible 3 guns to the 1000 men. If the calculation is made according to the numbers given in note on page 119, the proportion would be 3·75 guns to the 1000 men. This is a larger proportion than in other armies. In the Prussian army it is about 2·74 guns to the 1000 men.

This proportion must always depend upon the nature of the service which the army is to be employed upon, the topography of the theatre of war, and the quality of the troops; the better they are the smaller the number of the guns required. An army occupying defensible positions requires more guns than does one engaged in offensive operations in the field. Too many are always a heavy burden that hampers the movements

and withdraws a large number of fighting men from the force for their protection. Armies like that of the U.S. during the late war, who have an immense artillery to make up for the inferiority of their infantry, lose whole batteries at every period of a campaign. The question of siege trains is not considered here; the nature of the service upon which the army is to be employed, and the number of fortified places in the theatre of war, must determine their necessity or otherwise, as also their composition, &c.

Modern inventions have so improved the precision of fire, the range and the mobility of artillery, that there is an outcry at present to increase the number of guns per 1000 sabres and bayonets. This cry is made chiefly by men whose only knowledge of guns is from seeing them fired at a target, or with blank cartridge at a review, where the precision of aim in the first instance and the terrific noise in the latter have sent those gentlemen home with the notion, that "one cannot have too many guns." For the real damage done by artillery see article on that head farther on. An inordinate number of guns with any force is most embarrassing, for any guns that cannot be brought into action are most injurious in their effects upon the result, as they block up the roads, and hamper every movement; at present, under ordinary circumstances, I believe 3·75 guns per 1000 fighting men to be about the maximum proportion that can be taken into the field with advantage at the beginning of a campaign when the regiments of cavalry and infantry are up to their full establishments.

ENGINEERS.—One company is attached to each division, of which it is to form an integral part whilst the army is in the field. When a siege is determined upon, it may be deemed necessary to collect all or several of the companies together.

The proportion of engineers to sabres and bayonets has usually been counted as 1 to 30. This proportion was laid down before the duties in connection with the maintenance of railways and working of telegraphs were included in engineer duties. In the Franco-German war the engineers were nearly 1 to 28 sabres and bayonets in the 2nd army.

The proportion of pontoon equipment with an army must depend upon the number and size of the rivers in the theatre of war. The quantity of telegraph wire required with an army in the field will depend upon the extent to which lines of telegraph exist in the country to be operated in.

The Base of Operations, as stated many times throughout this book, must be, with us, some port or ports on the sea-coast. Their management is of the utmost consequence to an army, as all who can remember Balaklava in 1854 will understand. To such a place an able administrative officer (if not a general, one of rank and experience on the Q.M.G. or general staff) should be appointed as commandant. He should take his orders direct, and only from the general commanding or the chief of the

staff (or Q.M.G.), and no other general officer, no matter what may be his rank, if even living there for several days, should have the power to give him orders or assume any authority whatever over him. The extent of the place and the size of the army must determine the staff required. A harbour-master of experience should be under his orders, over whom the naval authorities should have no power. It should be laid down as a rule, that the commandant should be supreme, not only in the town but in the harbour. It is a good thing to have a ship of war there, as the men can render invaluable services when there is any particular haste required, and they are clever at constructing wharfs. They are useful in enforcing the orders of the harbour-master as regards the police regulations afloat, established by that officer; but it should be clearly understood, that no naval officer, no matter what may be his rank, should issue orders to the harbour-master or interfere in any way with the harbour regulations, as approved of by order of the commandant.

As stated in the article on Police, the P.M. duties in such a place are most important. Even supposing that there are no inhabitants, a large number of sutlers are sure to congregate there, and amongst them a host of spies. The first grand point to establish is a positive prohibition of the sale of intoxicating liquor stronger than light wines and beer. Circumstances must decide the strength of the garrison, but the fewer the soldiers the better. A special corps of police should be sent from England for duty there. The ordinary police duties being attended to, a corps of scavengers should be handed over to the P.M., who will act upon the advice of the medical officer on the spot. The commandant's quarters and office should be under the same roof, and whenever he leaves them, even for an hour, one of his staff should remain there to represent him. He must establish a hospital, to be in the suburbs if possible, where, if necessary, sick men coming from the front can be temporarily lodged until sent to England.

Previous to handing over the wharfage and store accommodation furnished by the town to the Control Department, a portion must be reserved for the medical and veterinary departments; in dividing the storage, &c., the relative proportions for the several requirements, 1st, for provisions of all sorts, 2nd, for what are generally known as military stores, 3rd, for the medical department, 4th, for hospital stores and equipment, and 5th, for veterinary purposes, may be assumed approximately to be 50, 33, 5, 10, and 2. There should be a capacious shed at the medical wharf for the protection of the sick whilst temporarily waiting for the boats which are to take them to the ships.

A corps of labourers, either natives of the country or civilians enlisted in that capacity in England, should be sent to work at landing stores, &c. They should be exclusively under army officers, at the rate of about one

officer to every 200 men. Amongst other police arrangements, precautions against fire should not be neglected.

It is advisable to keep plenty of clear space round the wharfs, as the difficulty of landing stores is rendered most serious when they are confined, as at Balaklava and Peytang. If storehouses are to be built, they should be placed about 80 yards from the water's edge. In fine, it should be remembered, that upon the manner in which the duties at such places are carried out the success of all operations in the field must greatly depend, and that those duties can only be efficiently carried out under one man, to be a general or other staff officer of rank.

Sea Transport.—Under existing regulations, the transport of troops by sea is, unfortunately for the army, entirely subject to Admiralty control. When conveyance by ship is required for men or stores, application is made for it by the Q.M.G. department to the senior naval officer on the spot, specifying the exact numbers, with their several ranks, and the quantity of baggage to be conveyed. It rests with him to decide whether he can provide conveyance in any of Her Majesty's ships at his disposal, or whether he must hire merchant vessels. If the latter course is decided on, tenders of vessels are advertised for. All ships that are offered should be invariably inspected, previous to being taken up, by a Q.M.G. and a naval officer, for the purpose of ascertaining if their general character fits them for the conveyance of men and horses. It is the especial duty of the former to see that they are generally calculated to accommodate troops with comfort: that they are well ventilated, or capable of being made so; that they are not infected with vermin; that no bad smells exist which cannot be easily remedied; and that the height between decks, from deck to beam, is at least 6 ft. for men and 7 ft. for horses. Vessels with less than 30 ft. beam are not suited for the conveyance of horses. The hatchways for horses must be at least 10 ft. × 10 ft.; 12 ft. × 10 ft. is better.

In calculating the amount of tonnage required for the conveyance of so many horses and men, 10 tons may be roughly put down for each horse and 2 to $2\frac{3}{4}$ tons for the men, all ranks included.

In calculating the amount of space required for provisions, 10,000 rations (according to the scale laid down at page 53) will occupy 950 cub. ft. if the biscuit is in bags and the meat is salt beef, or 1,350 cub. ft. if the biscuit is in barrels and the meat is salt pork.

In converting the regulated weight of baggage into cubic feet, 100 are allowed for each ton, but the common marine ton is only 40 cubic feet.

In calculating the number of officers and men that any given vessel can accommodate, the number of berths in cabin gives the former, provided they come up to the following regulations.

Cabins for officers must not be less than, for one officer, 30 superficial

and 195 cubic feet; for two officers, 42 superficial feet and 270 cubic feet. When more than two officers are to be in one cabin, 10 additional superficial feet to be allowed for each, independent of bed-place, the size of which must be 6 ft. × 2 ft. (min.) At least one water-closet must be told off exclusively for military use.

The cabins for staff sergeants must be of same dimensions as for officers.

In sailing-vessels, troops, passengers, or others, are always to be accommodated below.

In steamers, all troops or other persons, embarked for voyages exceeding *three weeks* in duration, must be accommodated below. For voyages of less duration, accommodation for all below need only be provided in vessels leaving this country during the months of November, December, January, and February; but, during the remaining months of the year, *one-fourth* of the number embarked are to form a watch on deck. Thus, if a ship can berth 300 men below, 400 men may, in such case, be taken on board; care, however, being taken that proper shelter, under cover, is provided so far as may be practicable for the watch in bad weather.

It is not, however, intended, when a regiment or large detachment of troops is to be embarked, to limit the numbers to be received on board so strictly in accordance with the above regulation as to exclude a few men, provided accommodation can be made for them without crowding the troops.

To calculate the number of hammocks that can be hung up on any given deck, use the following formula:—L length of deck in feet; B its breadth in inches; then $\frac{L-3}{6} \times \frac{B}{16} = n$.

If $\frac{B}{16}$ does not leave a remainder greater than 8, then 1 must be deducted from the result. Fractional remainders are to be struck out. The cubic space for a man to be roughly estimated at 52 cubic feet, and 126 cubic feet for a horse. In making these calculations, the space required for the hospital must be struck out. It should consist of standing bed-places in two tiers, at the rate of 2 per cent. of the numbers embarked for short, and 3 per cent for long voyages. Swinging cots for the sick, at the rate of 2 per cent., must also be provided in addition for the numbers embarked. Latrines to be fitted for 5 per cent.

As a general rule, it may be assumed that the larger the vessel the better adapted she is for the conveyance of men and horses, and the greater will be the economy. Steamers are always preferable to sailing-vessels, as they make much shorter voyages. For horses, paddle-steamers are to be preferred. Indeed, in very rough weather, screw-steamers are dangerous for them. In calm seasons cavalry can be conveyed well in large sailing-vessels, towed by powerful steamers. Small ships should never be used for horses. Those with 30 ft. beam will allow of a row of stalls on each

side, and of a passage in the centre between them of 10 ft., besides 3 ft. between each row of stalls and the ship's sides. Horses should never be placed near the stoke-hole, as the heat is likely to bring on inflammation. In all troop-vessels ventilation is of primary importance: good port-holes, or scuttles, are indispensable. Windsails down every hatch to each deck should be insisted on. If time admits, fixed air-shafts of wood or iron should be provided for each deck. Danks' ventilating shafts should be fitted so as to be worked by the donkey-engine in all steam ships. For sailing-vessels, exhausting pumps, to be worked by the men, should be provided. With horses on board, their safety and condition mainly depends on their having plenty of fresh air. When horses are below, care must be taken that no direct draught bears upon them, particularly in the region of the loins.

All transports to be fitted with strong accommodation-ladders for embarking and disembarking men. Infantry ships should have one on each side; those for artillery and cavalry only on one side, the other being kept clear for horses, &c. There should also be to every transport, on each side of the poop, a Jacob's ladder for the use of sailors, to be at some distance from those for the troops.

For the officers to be embarked, the following are to be provided by the owners. In the cabins, sheets and proper bedding, washing apparatus complete, small tub included, and a swinging lamp. There should be proper means of heating the saloon, a due quantity of chairs, tables, &c. A sufficient supply of knives, forks, and other mess-articles, including table linen. A cook-house separate from the rank and file.

To be provided by the owners for all other ranks: for each man, a hammock and two blankets, and 5 per cent. of the latter spare to meet contingencies. One of the following articles for each mess, but two if the mess exceeds 6 adults:—Iron-tinned bowl, round tin dish, and elliptic tin platter; 1 carving-knife and fork for every three men. For each man a tin plate, tin pint pot, and iron spoon. For each mess a canister, pot-hook, wooden mess kits ($1\frac{1}{2}$ gallon), (with two iron hoops, and an iron bale), mustard pot (half-pint), pepper dredge, salt jar, pickle jar, potatoe net to hold 12 lbs., bag to hold 30 lbs. of biscuit, and 2 scrubbing-brushes to clean tables. A washing-tub for every six men, two large and two small water-buckets for every 100 men. A bathing-tub for each 100 men, and water cans sufficient to serve out water to all the men. A porter tub of 20 gallons for each ship.

For cooking purposes and issue of provisions, a cooking-place distinct from the crew, to be complete, with funnel and double boiler, poker, shovel, tongs, &c., and a hot plate, to be placed under the forecastle, or under cover, and to be of sufficient size to cook provisions at one time for the full number of troops the ship can carry. The cook-

house to be tinned throughout, and the coppers to be of capacity to contain three pints for each person to be embarked.

A flesh fork, and a set of culinary utensils, &c., to be approved of by the surveying officers; a set of weights and measures, and 3 hogsheads with lids, fitted with hinges and padlocks.

For hospital purposes: bedding, including blankets and sheets, for 5 per cent. of number embarked; 1 Fyffes' water chair, complete, for 100 to 250 men, and 1 for each additional 250. The owners must provide a condensing apparatus and a man to work it. It must be of sufficient capacity to distil during 12 hours one-fourth more than the full authorized allowance for all that are to be embarked. This should be tested before the troops are allowed on board; also a bakehouse and appurtenances, of sufficient size to bake bread for the troops 4 days out of the week.

Sufficient fuel for cooking, distillery, and baking, to be embarked by owner; also an ample supply of candles, lanterns, &c., for lighting purposes.

A proper magazine, for the security of powder or combustibles, is to be provided by the owners at their own expense, and is to be fitted close aft on the lazarette deck, lined throughout with wood, and secured with copper nails, copper padlock, hasp, and staple. It is to be of sufficient dimensions to contain the ammunition which it has been decided shall be embarked with the troops.

A lazarette deck is to be laid from the stern to the fore-part of the after-hatchway, and a bulk-head for the security of the provisions, and a room for their issue, are to be built thereon.

A platform is to be provided on deck, for the stowage of hammocks, &c., with a sufficient number of painted covers, properly fitted with stops, to protect them from the weather.

A baggage-room is to be provided of sufficient dimensions to contain the regimental baggage, camp equipage, and medical, purveyor's, or other stores to accompany the troops.

A shako-room is to be provided, the lower part of which is to be lined with tin, and fitted with a half-door, terminating at two feet from the deck.

A bulk-head in the fore-hold for coals is to be built, and the coals are to be shipped.

The between-decks are to be quite clear, and painted with two coats of white or stone-coloured paint. The decks on which the troops are to be berthed, or horse stalls fitted, are to be similarly painted.

Racks, to hold the arms of all embarked, to be constructed below in the most convenient place. Battens overhead on all decks occupied by troops, to be constructed to hold the knapsacks. If this cannot be done, a room must be made to hold them. Mess-tables, sufficient to dine all the troops to be provided—movable ones, that can be triced up, are the best. Leg-irons for 3 per cent. to be put up on board, and if considered necessary,

prison accommodation for 2 per cent. of those embarked to be provided by owners.

FITTING A SHIP FOR HORSES.—An officer fitting up a ship for the conveyance of a mounted corps should be most particular that the men have a compartment to themselves distinct from the horses: this is indispensable on the score of health; doors are frequently opened out between where the men and where the horses are—this is objectionable, as the effluvia of the horses should be kept from the men in every possible way. Every horse transport should have as many stalls on deck as possible, so that horses suffering below could be moved up there for a few days to recover, which they do quickly in the fresh air. There should be ample stowage-room for harness; it should be carefully packed in vats, all the iron having been previously varnished or coated with mercurial ointment to keep it from rusting. The saddle and bridle to be put in the corn sack and placed in the room allotted specially for the purpose.

There should be no water tanks on the horse decks, they are in the way, and the slightest movement near them frets the horses; they should be in the hold with a pump communicating with them from the horse deck.

When it is possible to do so, it is advisable to have a loose box (about 7 ft. wide) near a hatchway to admit of a sick horse lying down in smooth weather.

There should be a dispensary with fittings for the veterinary surgeon, and a forage issuing room large enough to hold one day's allowance for the horses embarked, fitted with bins lined with tin for oats and bran.

Stalls for horses purchased in England should be 6 ft. long, from inside of padding on breast-piece, to the inside of haunch-piece, and 2 ft. 2 in. clear width between the padding on side bales; 10 per cent. to be 2 in. narrower, and 5 per cent. being 6 in. longer.

Stalls between decks of the first-named dimensions are as follows :* see diagrams. Fig. 1[a] is a longitudinal section through stall; Fig. 2 is the plan of a stall; Fig. 3 is a cross section through flooring of stall, with an enlarged section showing the interval between the planks and the manner in which their edges are bevelled off; Fig. 4 is a section showing the manner in which the side bales are tenoned into the haunch-piece; Fig. 5 is a side elevation of stanchion showing the lock-bolt, &c.; Fig. 6, an inside elevation of the same; Fig. 7 is a plan and elevation of iron plate, with rings for securing halters to; Fig. 8, a plan showing movable portion

* *These details are not exactly those laid down by the Admiralty, but the dimensions of the stalls are the same. The fittings herein described are those which were fitted up by the author for the conveyance of the officers' chargers of* 13*th Hussars from Canada to England. The one great point upon which they differ from ordinary stall fittings is, that the breast-boards and haunch-pieces are within the stanchions.*

of longitudinal batten; Fig. 9, a section of the same; Fig. 10, interior elevation of breast-piece; Fig. 11, a plan of same; Fig. 12, plan of manger; Fig. 13, section through side of same showing iron work for fixing it to side of stanchion.

In these figures the measurements are given in inches; the scale of 1[a], 2, and 3 is 5 feet to the inch; that of 4, 5, 6, 8, 9, 10, and 11 is attached to them.

The same letters are carried through all the figures, A being the stanchions; B, the side bales; C, the haunch-piece; D, the breast-piece; E, the uprights supporting breast-piece; F, the lock-bolt securing breast-piece and side bale: G, longitudinal batten; H, planks of flooring; K, cants; L, cleats securing head of stanchion; M, chocks between hind stanchion and side of ship; N, cross battens; *a*, rings for securing halters to; *b*, iron pin running through stanchion into side bale.

To construct the stalls, lay down *the cants*, K, at 7 ft. 5½ in. apart, the outer one being, if possible, 3 ft. from the ship's side [certainly not less than 2 ft.]. They are of red pine, 5 in. by 5 in., and secured to the deck by wrought iron one-inch bolts. They are scored ¾ in. deep on the insides, at intervals of 2 ft. 6½ in. [from centre to centre of score] to receive the heels of the stanchions, A A. *These stanchions* of red pine, cut to the exact height [from deck to deck] are of the same sized stuff, and rest below on the deck, fitting into the scores in the cants; they are secured to the deck above by means of elm or ash cleats [L], and by chocks [M], extending from the hind ones at intervals of about every 10 ft. to ship's sides. The cleats are fastened to deck by 5 in. spikes; the same sized spikes are driven in obliquely both above and below to secure the stanchions to the decks.

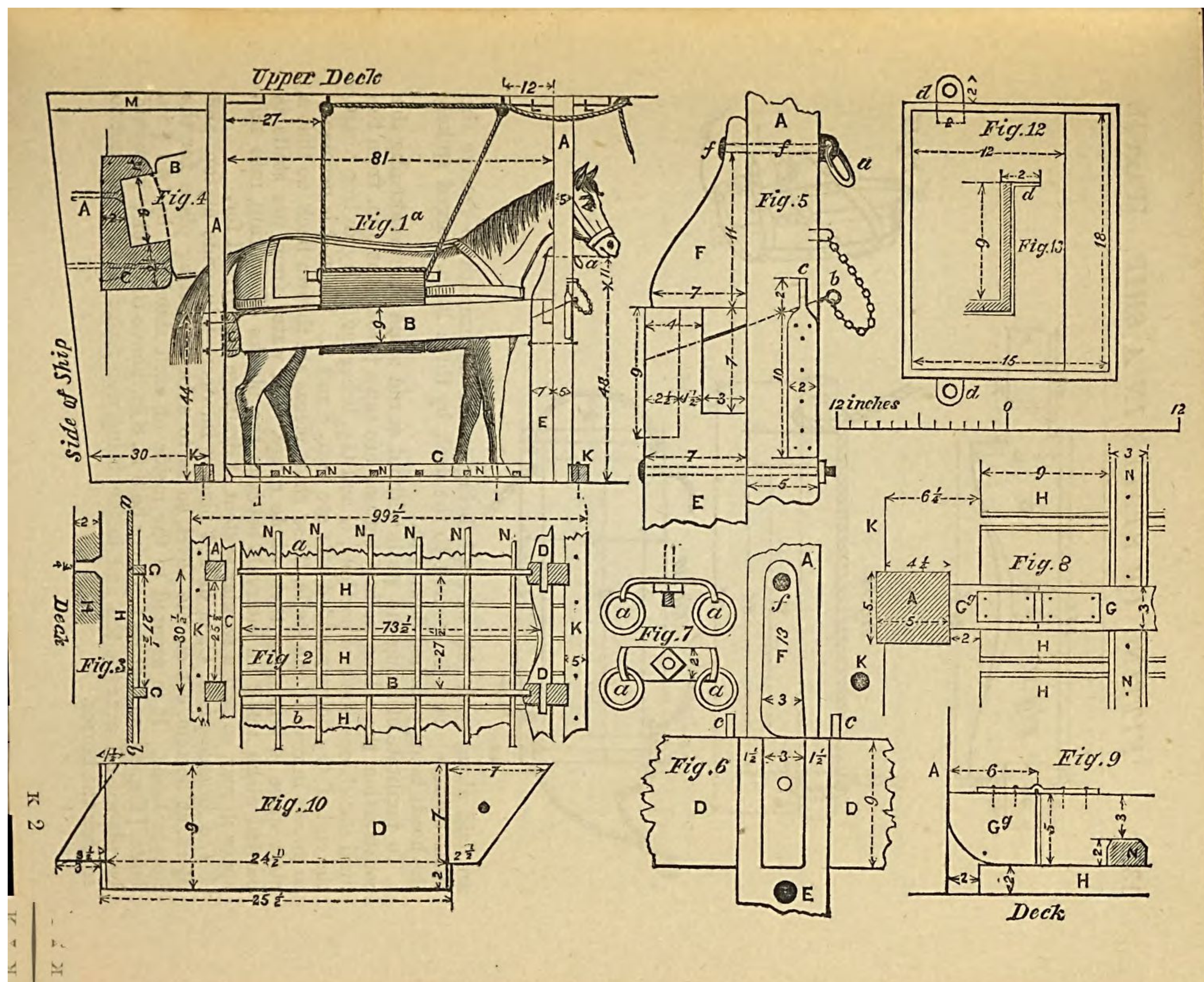
The short uprights, E E, are next placed: they are 4 ft. long, of any sort of pine, 7 in. by 6 in., and secured to front stanchion by a ¾ in. bolt at 12 in. from top: below they are secured by spikes like the stanchions, and by the flooring, cut away to receive them.

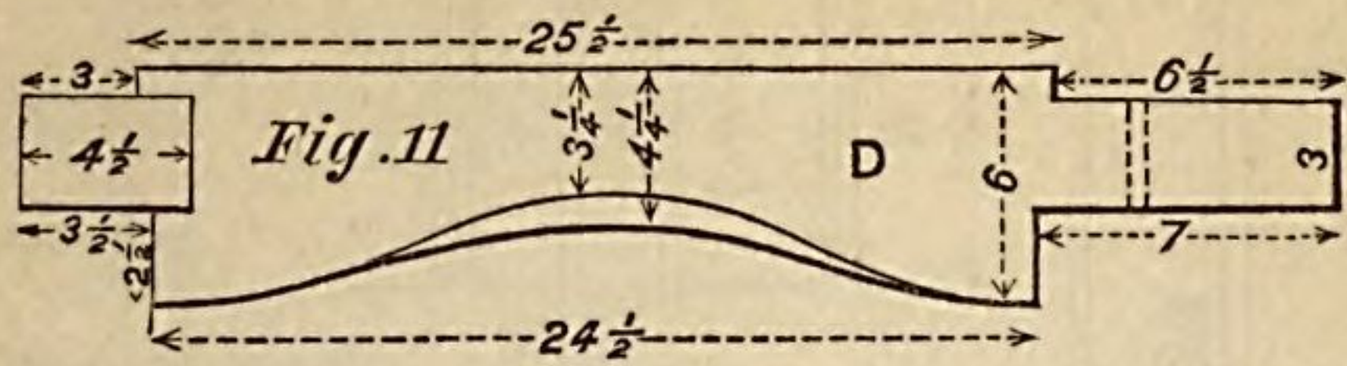
FITTING UP STALLS IN A SHIP.

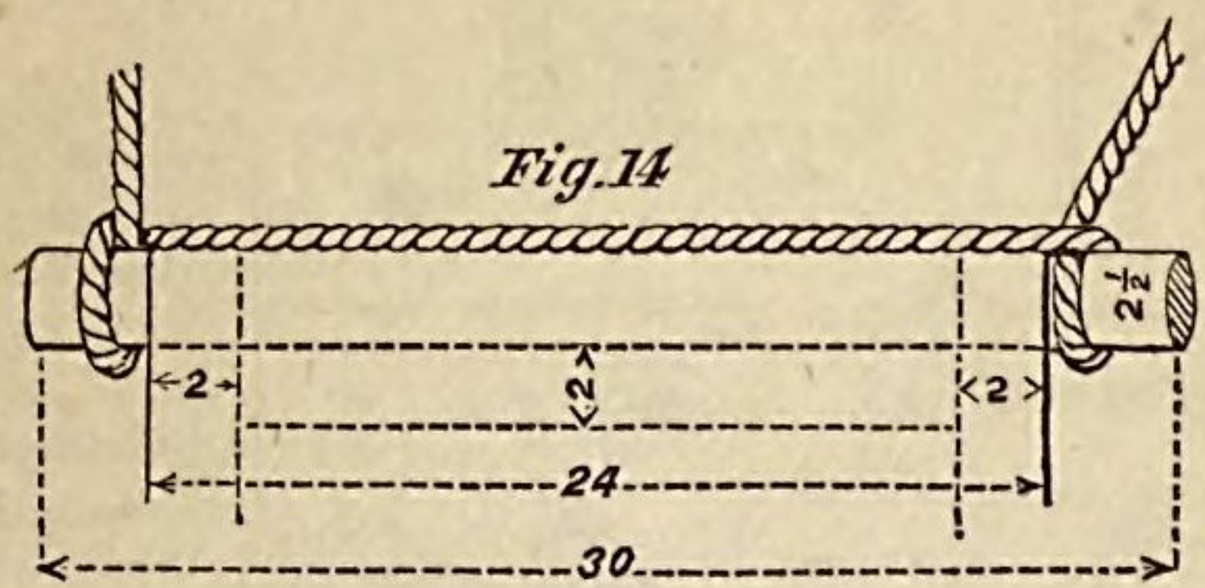
The flooring is of 2 in. plank [H H], spiked to deck by 5 in. spikes, driven so that they should, in every instance, be covered by the cross battens; the planks are laid longitudinally, extending from the front cant, to within 6¼ in. of rear one, with intervals between them of ¾ in. [except where they happen to meet under one of the battens, G G, when they are put close together]. The upper edges are bevelled off half-an-inch.

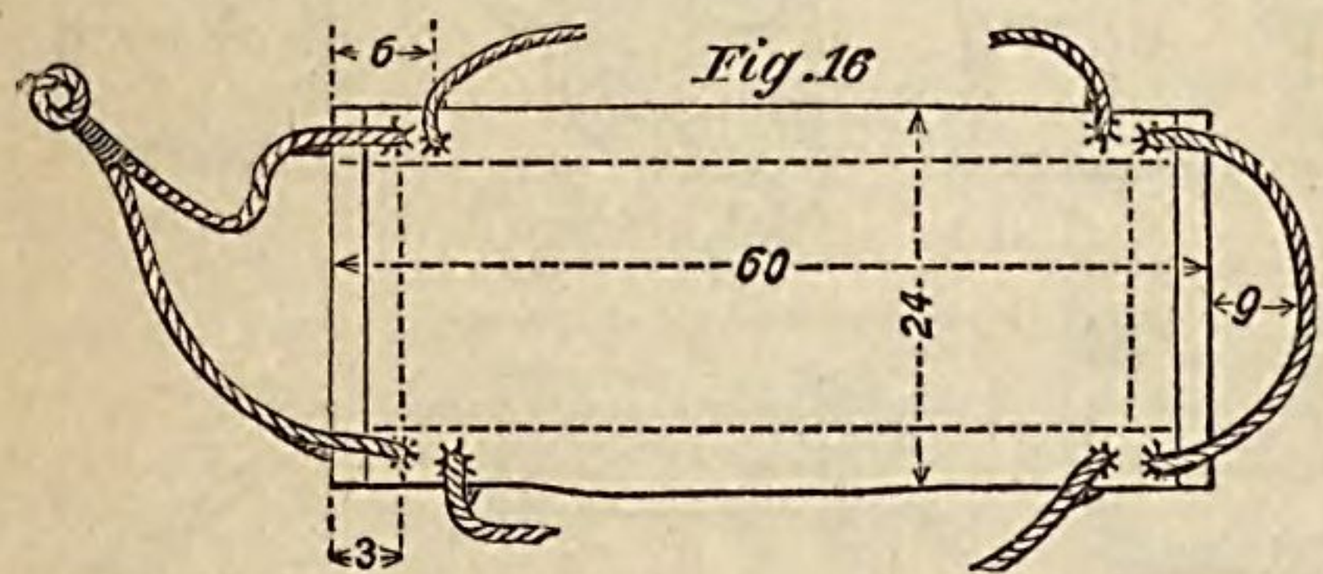
Six battens of elm or oak, 2 in. by 3 in. [N N], are laid across the planks beginning at 9 in. from rear of planking, the others at intervals of 12 in. from centre to centre: they are secured by 4 in. screws, countersunk ¾ in.

Longitudinal battens, G G, 5 in. deep, by 3 in. wide, and 6 ft. 9 in. long,


Upper Deck
Side of Ship
Fig.1a
Fig.4
Fig.5
Fig.6
Fig.7
Fig.8
Fig.9
Fig.10
Fig.12
Fig.13
Fig.3
Deck
12 inches
K 2







are laid along each side of stall, being scored underneath to receive the cross battens; each is secured to the deck by three 10 in. ragged spikes, the heads being punched down ⅜ in.

To facilitate cleaning the stalls without at the same time weakening the construction, these longitudinal battens are sawn through at 6 in. from the hind stanchions, the two portions, G and G*g*, being united by an iron hinge, the end of G*g* being rounded off: see Figs. 8 and 9. When it is necessary to sweep in rear of the stalls, these short pieces are thrown back, so that a clear space is left along their whole range. All water from the stalls is carried along the ¾ in. intervals between the planks of flooring, into this space in rear, so that a regular system of drainage is provided for.

The haunch-piece, C, is of red pine, 9 in. deep, 4 in. wide at top, and 5½ in. at bottom, cut on the bevel, so as to afford a resting place for the horses' hams. It is secured to the inside of each stanchion by two ¾ in. bolts [Fig. 4], so that its top may be 3 ft. 8 in. above the deck; it should be planed all over the top and inside, being well rounded off so as not to scratch the horses.

The breast-piece, D, of ash, 6 in. thick by 9 in. deep, is cut as shown in Figs. 10, 11. The breast-piece of each stall is thus removable; its ends rest in the short uprights, E E [cut away to receive them, Fig. 5]; and as they are cut diagonally, each keeps the piece on its right in its place. Fastened to the inside of each front stanchion is a lock-bolt of any hard wood, F [Figs. 5, 6], moving on a ½ in. iron bolt, *f f*; when down it keeps the breast-pieces and side bales in their places. The upper side of breast-piece is 3 ft. 11 in. above the deck.

The side bales, B B, should be planed all over, the edges above and below being well rounded off. They are of red pine, 9 in. by 3 in., and on a level in front with the breast-piece, in rear with haunch-piece: behind they are tenoned into the haunch-piece [Fig. 4]; in front they slide into the short uprights, being kept in their places by the lock-bolt, F, and by the pin, *b*, of ⅝ in. iron. This pin is fastened to a staple in the stanchion by a small chain 14 in. long., and passes in a sloping direction through both the stanchion and breast-piece into the side bale (Fig. 5), 15 per cent. of spare side bales should be embarked.

The padding should be of sheepskin long in the wool, put on double; it is only required in front and at the sides, if the haunch-piece has been properly smoothed over. It should be put on 24 in. lengthways along middle of side bales, and it should cover the inside and upper side of the breast-pieces. When sheepskin cannot be obtained, padding may be dispensed with on the side bales, and circular bags (shaped like a cavalry valise) of stout canvas stuffed with straw, 2 ft. long and 7 in. in diameter, may be used for the breast-piece. These bags should be secured by 4 strings at each end to the stanchions.

The mangers to be made of 1 in. planking, 18 in. long, 15 in. wide at top, and 12 in. at bottom, and 9 in. deep [all inside measurements], lined with tin, which should also cover over the upper edges; Figs. 12, 13. A ⅜ in. iron band, 2 in. wide, passes underneath, the ends turning out [*d d*], being pierced with ⅝ in. holes, by means of which the manger is suspended to the iron pins, *c c*. This iron band is nailed to the bottom and sides of manger.

Zinc, tin, or iron hooping, should be nailed along the stanchions wherever horses can get to gnaw them.

The horses' heads are secured by the halters of the head collars to the rings *a a*, which are fastened thus to the pin *f* [already described]. A piece of ½ in. iron, 5 in. long, and 2 in. wide, has a ⅝ in. hole pierced through the centre to admit the bolt *f*, and a hole of same size, at half-an-inch from each end. The ends are then bent forwards, and the rings, *a a*, of ½ in. iron, and 2 in. in diameter inside, are inserted in the outer holes. A nut screwed upon end of the bolt *f*, fastens the whole to the stanchion; Figs. 5, 7.

All the iron bolts, spikes, &c., to be of the best wrought iron.

There must be 10 per cent. of spare stalls, and there should be a loose box constructed near a hatchway to admit of a sick horse lying down.

Each stall to be numbered, the side bales, breast-pieces, and mangers, being marked with the number of the stall they belong to.

Movable shores, 4 in. by 4 in., should be provided, by means of which the stanchions can be shored up against the combing of hatchways, the masts, &c.; they should also be fitted between every 8th rear stanchion and the ship's side; these shores to abut upon the stanchions on a level with the breast-piece. They are only to be fixed in very bad weather. In narrow ships, a few shores might, with advantage, be placed, so as to extend from the front stanchions on one side of the vessel, to those on the other side.

Four blocks for the ropes of the horse hammocks should be placed over the side bales, two, at 1 ft. from the front stanchion, and two, 2 ft. 3 in. from the hind one. The front ones to be double, the hind ones, single blocks. An iron belaying cleat is fastened to the deck above, opposite each front stanchion, to which the ends of these ropes are secured.

It is advisable to have as many stalls on the upper deck as possible, unless extremely bad weather is to be anticipated. They are constructed like those already described, except that they are covered in above by a sloping roof laid upon rafters connecting the stanchions.

Kicking boards should be provided at the rate of 10 per cent. of the number of horses embarked. They should be of $1\frac{1}{2}$ in. deal, 8 ft. 3 in. long, and 1 ft. 6 in. broad. They should be fastened to the stanchions by 4 in. screws as required.

The horse-hammocks should be of stout web or of double No. 1 canvas, 5 ft. long by 2 ft. wide; each end passes round an ash stick, 2 in. in diameter, and 30 in. long, to which it is securely stitched. It is bound along the sides by a piece of webbing or doubled canvas, so that its edges are of four thicknesses of canvas 2 in. wide. A 2 in. rope, 30 ft. long, is passed round each stick, in a single clove hitch, as shown in Fig. 14 [being lashed together where it crosses], so that the rope from the rear side of hammock shall be $3\frac{1}{2}$ ft. longer than it is from the front side. The hammock is kept in position on the horse by a breast-band, 40 in. long, and a breeching, 56 in. long, both 4 in. wide. To keep them again in their places, a wither strap, 38 in. long, and a croup strap, 52 in. long, both 2 in. wide are required: both should be united along the horse's back by a band, 32 in. long and 2 in. wide; the wither strap to be attached to breast-band at 12 in. from the centre of it. The croup strap to be fastened to the breeching at 17 in. from the centre of it, all to be of stout web or double canvas. The breast-band and the breeching to fasten with stout straps and buckles to the hammock. See Fig. 1[a].

The slings hitherto issued for embarking horses are too short and too wide: they should be 5 ft. long and 2 ft. wide, made of stout web or of

double canvas, secured at each end by sticks 2 in. in diameter. The sides are frequently bound by a rope which hurts the horse, and are likely to make him restive; the same strength can be obtained by a 2 in. binding at the edges on both sides, made of stout canvas doubled. Breast and breech ropes, (2 in.) 9 ft. long, are fixed to each side, and are tied together, when the sling has been put under the horse. The loop attached to one stick is 9 in. long, that attached to the other is 2 ft. 11 in., and has an iron eye (3 in. inside measurement in diameter) fixed in the end. These loops to be of 4 in. rope. See Fig. 16.

A headstall is shown in Fig. 15: it is made of double canvas, the band going over the head being $2\frac{1}{2}$ in. wide and 35 in. from x to x measured round by x': the nose band measured from x to x, round the nose is 16 in. long and $2\frac{1}{2}$ in. wide; the forehead band, 2 in. wide, is $17\frac{1}{2}$ in. long. There are holes in the head band and face strap, so that they can be shortened by passing a string through them and tying the ends together; the throat strap is fastened by strings.

In addition to the stores already stated for infantry, the following articles for every 100 stalls have to be provided in horse-ships by the owners. Ten hand safety lamps, complete with oil and wick; in steamers, 5 hanging oil safety lamps, and 8 in sailing vessels. The following are supplied by Government in the same proportion:—4 peck and half-peck measures, 15 rakes or scrapers, 8 hoes, 15 shovels for filling baskets, 105 hay nets with meshes 5 in. wide, and made of stout cord, 105 halters, 105 horse-hammocks complete, 2 slings for hoisting in horses, 105 tail pads, 15 dung baskets, 50 birch brooms, 6 large and 6 small water-buckets, 10 large and 10 small water-pails, and 2 forage-tubs, 1 curry comb and a brush should be embarked for each horse for use during the voyage. A few blankets for the horses immediately under the hatches (6 for each hatchway), and sheepskins 2 per cent. to renew worn-out paddings, should also be put on board. When detached paddings lined with straw are used, spare ones at the rate of 15 per cent. should be shipped.

The owners of ships should be obliged to supply canvas and straw for the purpose of padding the coverings and insides of all hatchways down which horses are to be lowered. For every 50 horses embarked there should be 2 horse-boxes on trucks to enable sick horses to be easily moved about.

As regards the daily rations for horses on board ships, the experience of the Crimean war proved 5 lbs. of oats to be ample until within a few days of landing, when the full ration was given to get the horses into working condition. The bran ration should be 5 lbs.; for the first few days it is advisable to decrease the oats to 2 lbs. and increase the bran to 7 lbs. Vinegar and nitre should be put on board at the rate of 1 gill. and 1 oz. a day for each horse, to be used at the discretion of the officer commanding.

One feed a day of 2½ lbs. of carrots is invaluable for sick horses. All horses should be watered 3 times a day.

The supply of medicines for 50 horses on board ship for 3 weeks is as follows:—

	lbs. oz.	No.
Cathartic balls	..	6
Diuretic „	..	12
Fever „	..	12
Colic mixtures	..	6
Turpentine liniment	2 0	..
Tincture of myrrh compound	0 6	..
Sulphate of copper, powdered	0 2	..
Nitre, powdered	0 1 per horse	..
Oil of turpentine	0 8 per week	..
Blister ointment	0 2	..
Mustard	3 0	..
Sulphate of zinc, powdered	0 4	..
Tow	1 0	..
Digestive ointment	0 2	..
Nitre spirits of ether	0 10	..
Tincture of opium	0 4	..
Linseed oil	..	0½
Clyster pipes	..	2
Bladders	..	2
Sponge	..	2
Suture-needles, wire and thread	..	6
Linen bandages	..	6
Fomenting cloths	..	4
Paper for balls	..	0½
Scissors	..	1
Foot-swabs	..	2
2 oz. graduated glass measure	..	1
4 oz. „ „ „	..	1

SCALE OF FORAGE, &c., FOR HORSES.

	Oats.	Hay.	Bran.	Water.	Vinegar.	Nitre.
For each horse daily	6 lbs.	10 lbs.	½ peck. or 2¼ lbs.	6 galls.*	1 gill.	1 oz.

* *Can be increased with advantage to* 8 *gallons.*

NOTE.—An increased quantity of bran, not exceeding an additional quarter-peck per

SCALE OF RATIONS PER MAN ON BOARD SHIP.

Days of the Week.	Daily.															Weekly.				
	Salt beef, oz.	Flour, oz.	Suet, oz.	Raisins, oz.	Salt Pork, oz.	Split Peas, pint.	Preserved Meat, oz.	Compressed mixed Vegetables, oz.	Biscuit, oz.	Fresh Bread, lb.	Rice, oz.	Porter, pint.	Preserved Potatoes (uncooked), oz.	Sugar (unrefined), oz.	Tea, oz.	Vinegar, pint.	Mustard, oz.	Pickles (of various descriptions), oz.	Pepper, ground, oz.	Salt, oz.
Sunday	..	..	..	..	..	..	12	..	..	1	..	1	2	2	½	$\frac{1}{6}$	½	6	$\frac{1}{6}$	2
Monday	12	6	1	2	..	..	..	1	12	..	..	1	..	4	½					
Tuesday	..	..	..	..	..	..	12	..	..	1	4	1	..	2	½					
Wednesday	..	..	..	..	12	$\frac{2}{9}$	..	1	12	..	..	1	..	2	½					
Thursday	12	6	1	2	..	..	..	1	..	1	..	1	..	4	½					
Friday	..	..	..	..	..	..	12	..	12	..	..	1	2	2	½					
Saturday	..	..	..	..	12	$\frac{2}{9}$	..	1	..	1	..	1	..	2	½					

NOTE.—Spirit is not to be issued, except in special cases on certificate of the medical officer in charge.

day, may be issued in lieu of a portion of the oats or hay, whenever it may be deemed expedient by the military commanding officer. The full quantities of the daily ration should not be issued, unless in the opinion of the military commanding officer they are actually required.

All the articles are to be served out by full imperial weights or measures.

NOTES.

Temperance Men not receiving porter (or spirit, as a substitute) are each to be allowed daily, one ounce of sugar, and a quarter-of-an-ounce of tea, in addition to the quantities of these articles specified in the scale of rations;—those men who do not receive these additional quantities will be credited in office with a penny a day.

Neither porter nor spirit is to be issued to prisoners or 'Punishment Men,' except under medical advice, and with the sanction of the military commanding officer.

Preserved meat is to consist of beef and mutton, which are to be provided in equal quantities, and to be issued alternately.

Fresh meat and fresh vegetables are to be issued, *whenever practicable*, 1 lb. fresh meat being considered equal to 1 lb. salt meat; but 8 oz. of fresh vegetable are to be the ration for men. When fresh vegetables are not procurable, preserved potatoes (uncooked) 2 oz., or compressed mixed vegetables 1 oz., are to be issued in lieu.

Fresh vegetables are to be issued, whenever procurable, with salt or preserved meat,

SCALE OF MEDICAL COMFORTS FOR TROOPS AT SEA, CALCULATED FOR 1000 PERSONS FOR ONE DAY. (TO BE PROVIDED IN 'ADDITION' TO the ORDINARY RATIONS.)

Brandy, bottle.	Rum, gills.*	Port Wine, bottles.	White Wine, bottles.	Preserved Meat, lbs.	Prepared Soup, pints.	Essence of Beef, Tins (¼ pints).	Sago, lbs.	Arrowroot, lbs.	Rice, lbs.	Preserved Milk, pints (in small tins).	Lime Juice, pints.†
1	8	8	4	3	12	50	2	4	8	20	6

Sugar (unrefined) for lime juice, lbs.	Sugar (refined), lbs.	Tea, lbs. (best black).	Vinegar, pints.	Soap, lbs.	Pearl Barley, lbs.	Preserved Potatoes un-cooked, lbs.	Compressed mixed Vegetables, lbs.	Pickles (of various descriptions), bottles.	Chloride of zinc, pints.‡	Ale or Porter (bottled), pints.§
20	15	2	2	2	3	12	3	4	4	25

in lieu of the flour, suet, raisins, peas, compressed vegetable, preserved potatoes or rice, specified in the scales.

Fresh meat and fresh vegetables are also to be obtained, for two days' consumption after leaving port, should the weather admit of their keeping sweet.

In cases in which it may be impossible to provide fresh bread, biscuit is to be issued as the ration, in the proportion shown in the respective scales for men.

The commanding officer of the troops will report to the military authorities, on his arrival in port, if he should consider that biscuit has been at any time improperly or unnecessarily substituted for fresh bread.

Any articles in the foregoing scales of rations may be stopped or changed, but only in individual cases, upon the special requisition of the medical officer.

The scales of rations are to be regarded as generally applicable to invalids, as well as to persons in health; invalids are, however, to be provided with fresh bread, *every day*. In ships engaged for the conveyance of invalids, there is also to be provided a liberal proportion of live stock (oxen, sheep, and poultry, *but not pigs*), with provender

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* For occasional issue, at the discretion of the surgeon.

† Lime juice, with sugar, is to be issued only on the recommendation of the surgeon.

‡ A proper supply of disinfecting fluid is to be provided for use in the hold, in addition to the above quantity of chloride of zinc.

§ This quantity is to be increased at the discretion of the authorities at the port, in the event of porter not being procurable in sufficient quantity as an article of ration.

and water for their subsistence. The extent and nature of these supplies are to be, in each case, at the discretion of the naval or other Government authorities at the port, and they are to be replenished, as far as may be practicable, at any ports at which the ship may touch. Issues of poultry are to be made at the discretion of the surgeon.

WATER.

When there is a distilling apparatus on board, water is to be issued on the most liberal scale possible; but the minimum daily allowance of water (distilled or filtered) is to be for each individual embarked, including the crew of the ship, six pints when out of the Tropics, and one gallon when within the Tropics, which quantities are to suffice them for all purposes.

SCALE OF SUBSTITUTES.

The above scales of rations being sufficiently varied for health, are to be adhered to, except as regards the substitution of fresh for salted or preserved provisions, when practicable, in the proportions shown below. In order, however, to meet cases in which it may be actually necessary to depart from the scale, a list of equivalents is appended:—

Fresh bread	1 lb.	To be esteemed equal to $\frac{3}{4}$ lb. biscuit.
Flour	$\frac{3}{4}$ lb.	
Rice	$\frac{3}{4}$ lb.	
Fresh meat	1 lb.	,, ,, 1 lb. salt meat.
Spirits	$\frac{1}{2}$ gill	,, ,, 1 pint porter.
Coffee (roasted and ground)	1 oz.	,, ,, $\frac{1}{4}$ oz. tea.
Chocolate	1 oz.	
Fresh vegetables	$\frac{1}{2}$ lb.	To be esteemed equal to 2 oz. preserved potato (uncooked), or 1 oz. compressed mixed vegetables.
Flour	$\frac{1}{2}$ lb.	May be issued in lieu of each other.
Split peas	$\frac{2}{9}$ pint	
Calavances	$\frac{1}{2}$ pint	
Dholl	$\frac{1}{2}$ pint	
Rice	$\frac{1}{4}$ lb.	
Oatmeal	$\frac{1}{6}$ pint	,, ,, $\frac{2}{9}$ pint of split peas.
Coffee (roasted and ground)	1 oz.	To be esteemed equal to $\frac{1}{4}$ oz. tea.
Chocolate	1 oz.	
Fresh vegetables	$\frac{1}{2}$ lb.	To be esteemed equal to 2 oz. preserved potatoes (uncooked), or 1 oz. compressed mixed vegetables.
Flour	$\frac{1}{2}$ lb.	May be issued in lieu of each other.
Split peas	$\frac{2}{9}$ pint	
Calavances	$\frac{1}{2}$ pint	
Dholl	$\frac{1}{2}$ pint	
Rice	$\frac{1}{4}$ lb.	
Oatmeal	$\frac{1}{6}$ pint	,, ,, $\frac{2}{9}$ pint of split peas.

Embarkations.—The ship being reported by the naval authorities fit for the reception of troops, an inspection is to be made of her fittings. The points to be attended to are given in the questions in the following form of report, which are to be answered; the report to be signed by the members, who are to be a Q.M.G. officer (or other staff officer) and a naval officer. A medical officer of experience to attend, to give his opinion upon sanitary matters. The medical officer who is to proceed in professional charge of the troops should also be in attendance, if practicable.

Applications for the services of the naval members of these Boards should be made to the naval superintendent of the port, when there is one; otherwise, to the senior naval officer.

This inspection will, as a general rule, take place at the port to which the ship may first proceed for the embarkation of troops. At any subsequent port of embarkation the ship is not to be subjected to any further formal inspection before the troops embark; but only to the visit of the military officer commanding at the port, to ascertain whether any cause of complaint on the part of the troops exists, or whether the Transport Regulations have been departed from.

Immediately after the inspection a report, on the form given below, is to be made out in duplicate, and signed by all the inspecting officers. One copy is to be forwarded to the Director of Transport Services, the other copy to the officer commanding the district in which the inspection may be held, for his information and directions (if necessary), and for transmission by him, together with his remarks, to the Q.M.G.

REPORT OF PROGRESS,

Of the hired ship , fitted at , for the conveyance of troops from to , and now lying at .

1. Tonnage (gross, if a steamer)
2. If a steamer, horse-power of engines
3. If Board of Trade certificate has been examined
4. Name of master
5. When accepted
6. Height between decks in feet, poop, main, orlop
7. No. the ship is capable of conveying:
   Field Officers
   Other officers
   Staff sergeants
   Non-commissioned officers (not being staff sergeants), and men — In berths / In hammocks / On deck, under cover
8. Officer's cabins, if properly fitted, scuttles tight, and bedding supplied
9. Officer's saloon or mess-place, if complete, and provided with all the articles in Appendices XV. and XVI. of the Transport Regulations
10. Officers' mess—if proper arrangements have been made
11. Staff sergeants, if proper reserved accommodation is provided, and for what number
12. State of hammocks and bedding for the troops, and if a proper supply is provided
13. Number of berths for sick, if sufficient, and supplied with proper bedding
14. Prison accommodation, if sufficient
15. Troop decks, cabins, &c., if in a clean and proper state for the embarkation of the troops

16. Hammocks and bedding, if a space has been allotted for their stowage on deck, with painted covers for their protection in bad weather
17. Mess tables, stools, mess articles, and washing tubs, if they are in place
18. Mess utensils, if all the articles are provided, and in good order
19. Arm racks, and stowage for knapsacks and accoutrements, if satisfactory
20. Place for helmets and shakos, if provided

	Tons at 40 cubic feet per ton measurement.
21.*Space for regimental baggage	_____
" camp equipage	_____
" medical stores	_____
" purveyor's stores	_____
" other stores	_____

22. If the proper space for the baggage, camp equipage, and other stores is clear and ready
23. Medicines, if on board
24. Disinfectants, and articles for fumigation, if sufficient
25. Ventilation, if satisfactory, and whether Danks' machines are supplied
26. The separate cooking galley for the troops, if complete and adequate, and if arrangements for the cooking are satisfactory
27. What number can be cooked for at one time?
28. Coals for cooking, for how many days provided?
29. Articles for cooking purposes, &c., if all the articles (required by the Transport Regulations, Appendix XVII.) are provided, and in good order
30. Arrangements for the issue of provisions and water, if satisfactory
31. For what number of men the ship is provisioned, and supplied with water, and for what period of time
32. Is the distilling apparatus in good working order, and what number of gallons of fresh water can be distilled by it daily?
33. Are the arrangements for baking bread satisfactory, and for what number of men can it be baked four times per week?
34. Have provisions, medical comforts, and water, been examined, and found complete and good?
35. Is the victualling scale open to public view?
36. Ammunition, whether sufficient magazine space is provided and properly fitted and secured
37. Tarpaulins for hatchways, if sufficient and approved
38. Awnings, if sufficient and approved
39. Latrines and urinals, if sufficient and in good order
40. Fyffe's water chairs for the use of troops, if sufficient and in good order
41. If other requisite fittings and arrangements in regard to closets, and washing-places, are satisfactory
42. State of the well
43. Number of boats, and how many persons they would carry
44. State of the boats in case of emergency, and if provided with two plugs fitted with lanyards

* One hundred cubic feet, or 2½ tons naval measurement, are allowed for every ton weight of baggage sanctioned for troops by Her Majesty's Regulations.

45. How many fitted with lowering apparatus, and if Clifford's or Kynaston's
46. Precautions against fire, and for extinguishing the same, if satisfactory
47. Size of hatchway for horses ft. in by ft. in.
48. Height of horse deck
49. Number of horses to be conveyed
50. Number of stalls
51. If there is one spare stall for every ten horses
52. Stores for horses, if all the articles (required by the Transport Regulations, Appendix XVIII.) are provided, and in good order
53. Places for saddles, &c., if provided and sufficient
    Number of days' consumption on board
54. Forage—Oats
    „ Hay
    „ Bran
    „ Water
55. Vinegar and nitre, if sufficient quantities are provided
56. If arrangements for the accommodation of the troops are satisfactory
57. Are all the documents and forms (required by Articles 231 and 232 of the Regulations for Her Majesty's Transport Service) on board?

N.B.—The above Report is only made upon hired transports. No Inspection Report is made when troops are to embark in H.M.'s ships.

RETURNS REQUIRED BY CAPTAINS OF SHIPS.—Immediately on the embarkation of troops in H.M.'s ships of war or commissioned troop ships, the under-mentioned returns are to be furnished by the military commanding officer to the commander of the ship, in order that each person may be entered on the ship's books, and that no delay may take place in the issue of their provisions:—

I. A nominal list of officers embarking, according to seniority, showing also the appropriation of the cabins.

II. A numerical list of staff sergeants.

III. A numerical list of non-commissioned officers and men—not including staff sergeants, specified in II.

IV. A list of temperance men embarked, distinguishing those who wish to receive tea and sugar.

V. A return of all ammunition which may accompany the troops on board.

When troops embark in a hired ship, the foregoing information is also to be furnished by commanding officers to the master of the vessel, except the numerical lists only of the officers need be given.

Embarkation returns, on the prescribed forms, are to be prepared by commanding officers of corps, and forwarded, as soon as the troops are on board, to the Q.M.G.

The transports having been told off for so many men and horses, the force to be embarked in each must be named by the Q.M.G. or chief of the staff in the most convenient manner, so as to keep corps, or units of them, such as squadrons and companies, as much together as possible; each unit to be complete in itself, having its regimental transport, &c., in the same ship with it, so that, when disembarked, it may be at once ready to fight or march inland some miles to camp or bivouac. Too much stress cannot be laid on this point, for nothing is more fatal to efficiency than the system frequently followed in past wars by our storekeepers and commissaries—and still advocated by many of them—of placing the men in one ship, their

food in another, their camp equipment in another, their carts in another, the horses for the carts in another, and so on. If four ships, say, are necessary to convey a battalion with all its equipment for field service to the point where the landing has to be effected during war, it is in my opinion essential that each ship should contain so many companies, according to the carrying capacity of each ship, who should have with them—in accordance with the nature of the operation to be undertaken upon landing—every necessity to enable them to act efficiently the very hour they disembark. The theory that I have heard propounded by some of the ablest men we have in charge of stores, 'that in every war we undertake, it would be necessary to collect our *materiel* at the point of disembarkation before despatching our fighting men to it,' is the theory of the storekeeper, and not of the S.O. who has had much war experience: it is opposed to all sound military principles. The artillery with us has hitherto been the only corps permitted to embark with each unit of its organisation complete on board the same ship, instead of having its guns on board one ship, the horses in another, and the men in another. It is to be hoped that the next time we have to undertake an operation like our landing at Old Fort in 1854, our infantry as well as our artillery may disembark with its regimental transport, &c., so as to be ready for immediate service. Every little detail for the embarkation must be put on paper in the form of an order by the responsible S.O., and communicated by him to all concerned. The larger the force the more this is necessary. In doing so, he must make his arrangements with the senior naval officer on the spot.

This subject must be treated under two heads:—

1. Embarking when there is no chance of being interrupted by the enemy.

2. When an attack by the enemy is possible, or the embarkation is to take place in his presence.

1. EMBARKING WITHOUT ANY CHANCE OF INTERRUPTION.—If the transports can be brought alongside quays or wharfs, the work is greatly facilitated. The more numerous the wharfs or embarking places made use of the better, and it is an advantage that there should be at least 200 yards between each. When embarking from an open beach, posts, or other signs, should be erected, each, as in the case of wharfs, being numbered, to distinguish them. The nature of the locality will indicate which should be used for stores, cavalry, infantry, and artillery. If there is time, a few stages should be run out into sufficiently deep water for the boats to come alongside; this is all the more essential if there is a surf.

If there are no quays or wharfs, the troops must be taken out to the ships in boats; small steamers, such as gunboats, are very useful for this purpose. If the embarkation is to be in a bay or harbour where the sea is

calm, long piers formed with pontoons, casks, or boats, are most useful, and facilitate the embarkation immensely. We used them to great advantage at Balaklava, when the army embarked in 1856. Horses can, in this manner, be walked out to the ship's side, and slung from thence on board. These piers can be shifted about with great ease from one vessel to another. In drawing up the orders for embarkation, the following points must receive attention, and instructions be issued regarding them:—

The name of the S.O. who is to attend, the hour each corps is to be drawn up, how formed and where to go on board, the dress to be worn, whether rations, and what sort, are to be issued on shore, amount of ammunition and camp equipment to be taken on board with each regiment, the amount of baggage, the order in which the men embark, entering into special directions about how the men go into the boats and get out of them, if boats are to be used. The hour of the tide's ebb and flow must be considered. The nature of the service upon which the troops are to be employed, and the climate in which operations are to be carried on, must gratly influence these matters: as also, whether they are to land in a friendly country or a hostile one, and if the latter, whether the landing is likely to be opposed or not. It should be remembered, that whatever it is desirable to land first, should be embarked last; and that, the success of the subsequent disembarkation, if it is to be effected in presence of an enemy, or where an action may be immediately expected, will, in a great measure, depend upon the manner in which troops have been provided with the required means for landing quickly. If boats are used in embarking, the men should take off their packs on getting into them; they must be warned to remain perfectly quiet, and the strictest silence must be enforced, the officers and N.C. officers being duly distributed throughout them. When a regiment or detachment proceeds on active service in the field, the embarkation of soldiers' wives is altogether forbidden.

If possible, the colonel, adjutant, and quartermaster of each corps should go on board the transport about half-an-hour before the men. The exact position of each company can thus be marked in chalk on the mess-tables, so that, according as the men come alongside, they can be marched down to their places at once, where they are to sit down, holding their packs and rifles, and remain there until ordered to move. The men to be told off into messes before leaving the shore, according to the size of the tables. The rifles should then be passed along a line of men, and put into the racks by companies, barrels inwards, and the knapsacks placed by the men in the battens over their mess places; if the ammunition is to be left in the pouches, they must be sent below and stored in a magazine, but it is generally better to take out the ammunition and put it there, hanging the pouches over the mess place.

A second inspection of hired ships will be held by a Board of officers, as soon as convenient after the troops are on board, the baggage stowed, and the ship in all respects ready for sea; the object of this inspection being to ascertain whether the arrangements for berthing the troops, stowing the baggage, &c., have been carried out. When troops are embarked at more than one port, this inspection will take place at the last port of embarkation.

This Board will consist, when practicable, of—

One or more naval officers, a staff or field officer, and a captain not proceeding with the troops.

A military medical officer not in medical charge of the troops embarking is to attend to give a medical opinion.

Before commencing their inspection the Board is to communicate with the officer in command of the troops embarked, and to request him to accompany them. The report of the Board is to be made out in duplicate on a printed form given below, one copy being for the Director of Transport Services, the other for the general officer in command at the station, by whom it will be transmitted to the Q.M.G., accompanied by any remarks he may wish to make.

REPORT OF THE FINAL INSPECTION BEFORE SAILING.

Of the hired Ship , now lying at , having on board Troops or .

I.—Has the copy of the 'Note Book of Equipment,' kept by the assistant transport officer at the port of fitment, been received by the military commanding officer? or, is it in possession of the transport officer on board.

II.—Have the arrangements therein made been carried out, particularly as regards—

1st. *Arms.*—Are they placed in the racks appropriated for them?

2nd. *Knapsacks* and *Accoutrements.*—Are they stowed in the places allotted for them?

3rd. *Shakos, Helmets,* &c.—Are they stowed in the places allotted for them?

4th. *Hammocks* and *Bedding* for the troops—

Have those for present use been ssued?

Are they stowed in the places allotted?

Are those on deck provided with painted covers for their protection?

5th. *Messes.*—Have the troops been told off to the tables appropriated for them?

6th. *Provisions and Medical Comforts.*—Are the arrangements made for 'getting them up,' and issuing them, being carried out?

7th. *Cooking.*—Are the arrangements being carried out?

8th. *Fuel for Cooking.*—Are the arrangements for providing it, and supplying it to the cooks, being acted on?

9th. *Fire Regulations.*—Have they been read to the troops by the military commanding officer, and has their attention been called to the printed copies hung up between decks?

10th. *Baggage.*—Is it all stowed in the baggage room provided for the purpose?

Particulars of baggage not stowed, according to regulation, in the baggage room.

a. If not so stowed—in what other part of the ship is it stowed?

b. Description . { Officers' / Others'

c. Estimated quantity in cubic feet . { Officers' / Others'

d. When, and under whose authority, was it received on board?

e. By whose directions was it stowed where now placed?

11th. *Regimental Stores and Quartermaster's Stores.*—
If stowed in place allotted?
If not, where are they stowed?
By whose directions were they so stowed?

12th. *Camp Equipage, Tents, &c.*, belonging to the troops.—
If stowed in place allotted?
If not, where are they stowed?
By whose directions were they so stowed?

III.—*Staff Sergeants.*—Are they occupying the reserved accommodation provided for them?

IV.—*Latrines.* — Have proper arrangements been made for keeping them clean? viz.—
Those for officers.
Those for men.

V.—*Troop Decks.* — Are they perfectly clear of baggage, stores, &c.?

VI.—*Horses.* — Are they in the places allotted for them?
Are the proper number of spare stalls available?
Are the stores provided ready for use?
Forage.—Have proper arrangements been made for supplying and storing it?
Vinegar and Nitre.—Have proper arrangements been made for supplying and issuing them?
Saddles, &c.—Are they stowed in the places provided for them?

VII. Is the ship in all respects ready to proceed to sea?

To be signed by the members, and a statement, made by the doctor, who accompanied the Board, of any remarks he wished to make respecting the ship. These inspections, both before and after the troops embark, are not to be made upon Her Majesty's troop ships.

No transport or troop ship, after embarking troops for any foreign station, is to sail excepting in cases of great emergency, until the day following that on which they may be embarked; and when the delay of twenty-four hours from the time of embarkation will not, by a loss of tide or daylight, involve a further detention, the ship is not to sail until the expiration of that period.

HORSES require great attention *at the time of embarkation*, and while they are on board ship; and every officer of mounted corps has a most important duty to perform on these occasions, on which depend, in fact, the means of his being usefully employed in the field, when he reaches his destination.

Horses should be kept in a cool state before embarking, and should be put on board ship rather low in flesh than in too high condition; in which latter state they are more disposed to be fractious and to kick, and are, moreover, more liable to inflammation.

Long, slow, steady work is to be given to horses previously to their embarkation. They are to be kept fasting and without water for some hours before being put on board, as slinging them is more likely to prove injurious when their bellies are distended with food; and they will sooner become reconciled to their change of quarters, and take to their feed on board, when they have been kept fasting previously. The calkins of the hind shoes are to be removed before embarking, as they are not needed on board, and in the event of any kicking, do much injury.

Horses to be embarked should be drawn up by troops as near the point of embarkation as possible, their saddles or harness taken off and packed in vats or large sacks (the corn sack does very well), the ship head-collars being put on: the farrier sergeants will inspect the horses' feet and shoes. The men having stripped their horses, &c., the Right Files, leaving their horses in charge of Left Files, will go on board if the vessel is alongside, and put their arms, &c., in the places assigned for them, returning to shore in fatigue dress. The Left Files will then do the same. If the horses have to walk on board by a floating wharf or brough, the planking should be strewn with straw or grass, and the quietest horses always led in first.

Before commencing to ship the horses, the slings should be examined, to see that they are strong and in good order; 5 men are required to sling a horse quickly and well; one man holds the head-guy, which is made fast to the ship's head-collar; 2 men, one on each side of him, one of whom holds the sling, and passes the band under his belly to the other man; both men then hold up the ends over his back, passing the long loop through the shorter one, and hooking on the eye of the former to the lifting tackle, continuing to hold up the sling until the horse's legs leave the ground; another man stands at the breast and fastens the breast-strap, and the fifth man stands at his rump and fastens the breaching; the officer superintending gives the word 'hoist away.' The first man slacks away at the guy-rope, just keeping it sufficiently taut to keep his head steady.

He is to be run up from the ground at a rapid rate; and, after attaining the necessary height, be carefully and steadily lowered down the hatchway. Care should be taken to have two or three careful and active men stationed between decks to see that his head, legs, and tail are not injured in descending to the lower deck, where a soft bed of straw must be provided for him to alight upon. Three resolute men are to be ready to receive him, and to take off the slings; as, on first feeling his legs, unless firmly handled, he is apt to plunge and kick violently.

When the transports cannot come alongside a wharf, the horses must be embarked in boats or flat-bottomed scows made for the purpose. The dragoon should accompany his horse, his kit being in the scow also. Whilst there he should be in his shirt-sleeves if the weather permits, but

under no circumstances should he be encumbered by his accoutrements. If embarked from a wharf, they should be walked on board by means of a brough or good gang-boards, the quietest being always embarked first. If the gang-boards have to be placed at a great slope, good battens should be secured at distances of 18 in. along them. These broughs should have planked sides 3 ft. high. Stubborn horses must be blindfolded and led with their heads up to the brough, when by means of a plank placed behind their haunches, and held on each side by a man, they can be forced forward without hurting them. It is much to be regretted that no board has ever yet reported upon the best description of boats or rafts suitable for embarking and landing troops, horses, guns, &c. When they are required, the intelligence of officers on the spot at the time must decide their dimensions; it should be laid down as a rule, that every transport should carry boats suitable for landing whatever may be its cargo.

In embarking artillery or land transport, care must be taken that each unit of the organisation is complete on board the same ship, and that under no circumstances shall a gun or a waggon be on board one ship, whilst the horses for it are in another. The guns and waggons should be put on board before the horses. The harness should, if possible, be packed in large vats and kept in a dry place on board. Tags specifying the No. of the waggon for each set of harness to be attached to the vats; the wheels will be taken off before embarkation, the linch-pins and washers to be carefully put away by the N.C. officers of each division or sub-division.

In embarking horses into boats from an open beach, every effort should be made to construct some sort of stage. If the water is shallow for 50 or 100 yards out, these stages should be erected where the boats, when laden, will float, the horse being walked through the water to the stages and thence into the boats.

The men should stand to their horses' heads whilst in boats, or if they admit of the horses being placed athwartships, heads and tails alternately, the men should sit on the gunwale, holding their horses by their head collars.

MANAGEMENT OF HORSES ON BOARD SHIP.—The horses are to be arranged on board in the same order as that in which they have been in the habit of standing in their troop stables. Horses which know one another will both feed better and stand quieter together. A kicker or a vicious horse should, if possible, be put in a corner stall.

For the first few days on board ship food is to be rather sparingly given, and bran is to form the larger portion of the horse's food; but after he becomes reconciled to his altered circumstances, and as his appetite increases—which it will do after he has been at sea a few days—he is to be more liberally fed. A bran mash, or oats and bran mixed, is to be given to him at least every other day.

The head-collar of canvas supplied by the ship is the only safe fastening on board, and there should be two shanks to each collar. The horse's head should be tied rather short than otherwise.

Spare stalls to the extent of at least ten per cent. are to be left in every horse transport, and half this proportion will be allotted to each side. By this means the horses can be shifted, cleaned out, rubbed over, and their feet washed every day, when the weather permits. The dung is to be drawn up the hatchways in baskets provided for the purpose, and thrown overboard, care being taken not to remove any of the shingle with it. Hand-rubbing the legs is of the greatest consequence to the comfort and well-being of the horse, and is to be practised every day, when the weather permits, and whilst the horses are being changed over. The provision of spare stalls on board will allow of this operation being more speedily effected.

Horses are to be slung in smooth weather, and allowed to stand on their legs in rough and stormy weather. In smooth weather they will rest their legs and feet by throwing their whole weight into the slings. To sling a horse in rough weather (whereby he is taken off his legs) would only have the effect of knocking him about, according as the ship rolls to and fro. Horses invariably *resist* the rolling motion of the ship, and throw the weight of the body, when allowed to retain their legs, exactly in the contrary direction to the ship's motion, which, if slung, they would be unable to do.

Horses are not to be placed in the horse hammocks until they have been at sea for a week, as some horses would be only made uneasy by the attempt to do so.

The hammock is to be placed in the centre of the horse's belly, and then the breast-band and breeching fastened to the required length and degree of tightness. The hammock should just come to the height of the animal's belly, *but no attempt should be made to raise him off his feet;* for when he finds the relief which is afforded by throwing his weight into the slings, he will not be slow in availing himself of it. With some horses it is necessary to use great quickness in making the ropes fast, before they throw their whole weight upon the canvas. In the spring of the year, *mares* are generally more troublesome on board than geldings, and are more inclined to kick and to rub against the bales, which in such cases are to be well covered with sheepskins, before they have caused injury by rubbing through the skin.

Too much attention cannot be paid to the constant trimming of the windsails, which must be kept *full to the wind*, and it is to be borne in mind that the *fore* part of the ship is that in which sickness invariably first exhibits itself amongst the horses, and therefore the greatest attention must be paid to throwing a stream of fresh air down the fore hatchway by means of the windsails, the lower ends of which should be carried to within a foot, or thereabouts, of the flooring.

When a horse between decks is very ill, and the weather is at all fine, he should be removed to the upper deck and placed in a stall there; such a change will bring round most sick horses. During long voyages it is advisable to change all the horses in that manner if there are a sufficient number of stalls on the upper deck.

In very rough weather, and if the vessel should labour very much, it will be found necessary to have all the men who can be spared to stand to their horses' heads, as the horses will be less disposed to be frightened when the men are with them.

The air tubes which run through the two decks, and are carried up behind the horses, also require to be constantly looked to, and nothing is to be permitted to be on the

decks which is likely to interfere with the thorough passage of the air, or choke up the apertures to those ventilators.

Vinegar is essential to the comfort of the troop horse on board ship, and is to be freely used. Chloride of lime should be also thrown on the flooring; or, what is better still, powdered alabaster or gypsum, to destroy the ammonia arising from the urine. Commanding officers are to ascertain that the necessary medicines for the voyage are prepared by the veterinary surgeons.

Articles supplied from naval stores, such as bedding, mess utensils, &c., for the use of troops in ships hired by the Admiralty, are to be in charge of the master of the ship, who is to issue them, as demanded by the commanding officer, to the quartermaster of the troops, or other person acting in that capacity.

The medical comforts are to be drawn from the master of the ship on the requisition of the medical officer, who is required by his departmental instructions to keep an account of their receipt and expenditure, and on arrival at his destination to transmit such account to the Director General of the Army Medical Department.

Articles remaining on board at the close of the voyage are to be returned to the master, accompanied by a list of deficiencies, signed by the military commanding officer, and stating by what corps the stores were lost or destroyed, under what circumstances any deficiencies occurred, and whether the troops are chargeable with their value.

Payment for articles so chargeable is in no case to be made to the master of the ship, but commanding officers are to take care that, when practicable, the amount is recovered from the troops on disembarkation and accounted for on the spot, under orders from the disembarking staff officer.

All transports are numbered with large figures on both sides. It would be well to have the distinguishing mark of the division to which the troops belong, painted 5 ft. high on their sides, the right brigades being known from the left by having this painted in white on black ground, and *vice versâ*.

Cavalry ships should carry some small distinguishing flag at their foremast, infantry the same at their mainmast, and artillery ships at their mizenmast head.

IN THE SECOND CASE, WHEN THE EMBARKATION HAS TO BE EFFECTED IN THE PRESENCE OF AN ENEMY, as the English had to do at Corunna, the sick, all stores, carriages, horses, and other material, are to be placed on board first. Circumstances must decide the order in which the guns and men are to be embarked. The possession of a small land fort, which prevents an enemy from approaching the point of embarkation, is of great value in such an operation.

It is a most trying one, under any circumstances; but the fire from the fleet (which it is taken for granted will be at hand) ought to keep the enemy at a distance. For this reason a low, flat, open beach is the best suited for the purpose: one with high cliffs which cannot be seen over

would prevent the fleet from protecting the flanks or sweeping the front of the embarking army.

Disembarkations.—In all disembarkations the Q.M.G. or other staff officer who has to make the arrangements, must state, in his memorandum of instructions, the manner in which it is to be carried out, the hours the several corps are to leave the ships, in what order, and by what means, &c.; the clothing to be worn, the rations cooked or uncooked, the ammunition, camp equipment, stores, &c., &c., to be taken by the men, or put ashore with them for their use. The nature of the service on which they are to be employed will enable the General commanding to settle all these important matters. The senior naval officer on the spot must be consulted, and all arrangements made with him regarding boats, &c.

Disembarkations must be considered under two heads: 1st, When made without any chance of interruption from an enemy; 2nd, when made in presence of an enemy, or where an attack is possible.

1st. THE DISEMBARKATION OF MEN, HORSES, AND STORES, is merely the reverse of what is done in putting them on board.

The men, when landed, must be marched off at least 500 yards clear of the beach, which is to be kept clear for those to land subsequently. If possible, it is advisable to march them at once to the spot where they are to encamp or bivouac, so that arms may be piled, cooking places, &c., made by a portion of the men, whilst the others return on fatigue to assist in landing stores, &c. The arrangements to be made must depend upon the mode in which the disembarkation is to be effected, whether by going alongside wharfs, or by boats, or small steamers. Every exertion should be made to erect some rough wharfs, the shallow part with trestles, that in deeper water being made with boats, ending with a barge and strongly-built schooner or vessel of that class. It may be sometimes advisable to sacrifice a ship for this purpose, and by scuttling her, sink her in such a depth of water as to have her upper deck three or four feet above high water. With a sandy or a muddy bottom, a ship might be sunk by loading her down with weights until she was resting firmly on the bottom. If the weather is calm she will suffer no great injury, and can be floated off when no longer required.

Brigades and divisions should be landed without being mixed up; each division, with its guns, horses, camp equipment, &c., should be complete on shore before another commences to leave the ships.

The hour of the tide's ebb and flow will generally influence the arrangements.

2nd. WHEN AN ARMY HAS TO LAND IN A HOSTILE COUNTRY, and in presence of a formidable enemy, as we did in Egypt in 1801, and in China in 1860, or at a place where it is possible we may be attacked before the

disembarkation is completed, as at Eupatoria in 1854, the operation is a troublesome one, but not so appalling at it is generally considered to be, provided the troops have in the first instance been embarked in a creditable manner, and the exigencies of the service upon which they are sent have been well provided for. It is of the utmost consequence that the expeditionary force should rendezvous at some place not more than a few days' steaming from the shore where the landing is to be effected. The force should be finally organised there, the horses and men being landed. This is very essential both for man and beast, but particularly for the latter; for, after a few weeks on board ship their joints become stiff, and they require rest and gentle exercise to fit them for a campaign. The first thing to be decided upon is the place where the landing is to be effected. Many local circumstances will influence this consideration, independent of the character of the coast and the physical nature of the country itself. Political matters, which enter into all great questions in war, and the distribution and nature of the enemy's land and sea forces, may force you to disembark an army in a locality, which, in itself, is not favourable for such an operation. These are subjects for the General-in-Chief. The duty of the Q.M.G. or Chief of the Staff is to make a close reconnaissance of the coast in company with a responsible naval officer; for, no matter what may be the advantages offered on shore, unless there is good anchorage and deep water near shore, no place can be deemed a good one for the disembarkation of an army. Of course, all objections must give way to necessity, as, for instance, in China, the best place for landing our army was on a mud bank commanded by a fort, which we believed to be heavily armed, and to which no large vessel could get nearer than nine miles.

[See paragraph on Coasts under the head of "RECONNAISSANCES."]

The point of landing having been agreed upon by the Commander-in-Chief and the Admiral, and the supply of horse-boats, platform-boats for guns and troops being ample, the order in which the army must land will be determined upon. This point should be known only to those two officers, who ought to be on board the same ship. It may be advisable to make a demonstration upon a totally different point from what has been determined upon, and it is always a good thing that a swift armed vessel with a small party should make descents upon the coasts at all points where the telegraph wires are near the shore, for the purpose of cutting them, and carrying off a few intelligent men as prisoners to give the General information upon local matters.

The arrangements are very imperfect unless the whole of one division can be put ashore in one trip. The transports carrying each division should anchor in lines in the order in which they are to land. The distance between these lines is a purely naval matter, as are in fact

the arrangements in general for actually carrying the men ashore. The boats, flats, &c., carrying the men, &c., will in future wars be towed ashore by small steamers, such as gun-boats. For all such boats there should be breakers to carry fresh water, so that there should be no want of it on the beach. The lines of boats being towed in as near shore as the depth of water will allow, the boats will have to pull in the rest of the way. The lines of the boats carrying the men must be led by light boats, which should be provided with sounding poles. Where these boats reach the shore should mark generally where the right of the organisation is to rest, whether it be a battalion or a brigade.

One division being put ashore, the boats will return for the other divisions in succession. The men will get into the boats in the order in which they stand in line, so that when the boats ground, the men getting quietly out from each side can form up at once on shore in line or column according to the orders. The men must sit quiet when in the boats, and the strictest silence must be enforced. Under no circumstances should the men load until they are on land. The colonel should be the first man of the battalion to land, as the captain should be of each company. The former will point out to the captain where to form up. The latter will, in the first instance, form up his company exactly where it lands, and then march it as a formed body to the position ordered by the colonel.

As the regimental transport and impedimenta should not be landed until a force sufficient to protect it is ashore, a party under an officer must remain on board each ship in charge of it, and land with it. A steamer should go round the fleet and collect all men unable from sickness to land. Vessels having sick men on board should hoist some preconcerted flag, so that the steamer should only visit them. By this means all the sick can be collected on one or more hospital ships; if there are no such ships, then on board the best ventilated transports, arrangements to be made for them by the P.M.O. It is advisable, in case of accidents, that the men should land with three days' cooked rations, and officers are clearly to understand that they are to do so also.

The first division ashore will act as if it were an advanced guard, and cover the landing of the rest of the army. For this purpose it should take up any strong position as near the beach as possible, taking care to do so in such a manner that the fire from the fleet or gun-boats told off to protect the landing may also protect its flanks. The best drilled battalion of light infantry should be pushed well to the front as skirmishers, immediately when the first troops land. If the landing is opposed, their primary object should be to silence any artillery bearing upon the beach. A squadron at least of cavalry should, under almost all circumstances, land with the first division that is put ashore. Parties

of it should be at once despatched to the neighbouring villages, to seize the posts and cut the telegraph wires, if there are any. It may be a good plan to send a telegraphic message in the name of the mayor, telegraph operator, or other functionary, to the military or civil authorities (as the case may be) in the neighbouring cities, saying, 'I have just returned from the coast. All is quiet. No enemy or ships to be seen anywhere. The fishermen (or John Smith, &c.), tell me they saw the smoke of a great fleet going north (or south) this morning at 5 A.M.,' &c., &c. It is possible sometimes to send false intelligence in this manner, which, if not actually believed, will shake belief in the true news, giving rise to hesitation and delay. Circumstances, such as the proximity of the enemy, and the nature of the position, must determine when the cavalry is to land; but the sooner it is landed the better, for without it all the transport and cattle will be driven away beyond reach of the infantry.

IN DISEMBARKING HORSES, the same precautions are necessary as when embarking them. For some days after a long voyage they should be led by hand at a gentle pace (not out of a walk), and no weight put on their backs. This rule, of course, has to give way to necessity. I have ridden and been carried fairly by a horse just landed from a ship, on board of which he had been for a month: but as in all these expeditions a rendezvous, such as Varna in 1854, and Talienwan Bay in 1860, will be generally established where the horses can be landed and got into condition after their long voyage, they need seldom be more than a few days on board immediately previous to beginning active service.

The disembarkation of horses by swimming is more easily effected than their embarkation by the same method, as their instinct assists in bringing them ashore. The horse should be lowered in the sling over the side without fastening the breast rope or breeching. When the tackle is unhooked the sling opens and is at once slipped from under.

It is of great consequence that a number of horses should be kept on the shore to which the others are to swim, as horses in the water will always swim towards others on the nearest shore. This plan of dropping horses out of slings into the water is said to injure their pluck, and make them for ever afterwards averse to fording rivers or entering water at all. It should only be resorted to in emergencies, and then care should be taken that the horses are cool before being put into the water.

All corps must send in to the A.Q.M.G., or senior S.O. of their division, as soon as possible after they have landed, a disembarkation return, showing the numbers actually landed, and accounting for every one included in the return of those actually embarked.

SELECTING A SITE FOR CAMPS OR BIVOUAC.—In deciding upon the site for any camp or bivouac, whether large or small, for occupation for a night or for a lengthened time, two great considerations enter into the question, viz., the *Military* and the *Sanitary*. When they clash—as they may frequently—the point must be settled according to their relative importance in each particular case. If a great battle is impending, everything must give way to the strategical or tactical exigencies of the moment, and troops may have to bivouac for many nights in positions that may be objectionable in a purely sanitary point of view. It may, however, be accepted as a general rule that, when beyond two days' march of the enemy, sanitary considerations are as a rule to be considered first.

The selection of positions for offensive or defensive purposes is treated as a separate subject, see article on 'POSITIONS.'

The Military considerations in selecting the site for a passing encampment or bivouac are abundance of wood and good water, and other supplies, and that it should be provided with facilities for internal communication, and that there should be easy access to the neighbouring roads. Although extension is good for sanitary reasons, yet it is very trying to men after a tiring march to have long distances to go for their rations, water, &c. The first sanitary consideration is that the men should have rest; so after long marches, in taking up positions for a single night, the camp or bivouac should be compressed: if a longer halt is to be made, it can be opened out the following day when the men have been rested. Villages, defiles, rivers and all other obstacles near the site selected should be in rear, so that they should not interfere with the next day's march; for it is important to have plenty of clear space to start on, as there is more likely to be confusion then than at any other time.

Sanitary considerations in selecting Sites for Encampments.

The sanitary, or some medical officer named for that purpose, should accompany the S.O. sent to select the site. He will make a report in writing for the Q.M.G.'s or Chief of the Staff's information, as to its fitness in point of salubrity, and will indicate the precautions required for improving its sanitary condition; he will report upon the quality of the water, and upon the precautions he considers necessary for purifying it.

There are many places which at certain seasons of the year may with safety be occupied for a few days, where at other times it would be madness to encamp.

There are rules which must not, under any circumstances, be neglected if the camp is to be permanent, and indeed the extent to which they can be disregarded at any time is to be measured by the exigencies of the moment. If obliged to encamp in a position where you expect to accept battle in a week, or a month, pitch on ground in advance of the position you must

occupy when the enemy is in your presence; you then secure a fresh place for your men, and leave him a dirty one when he moves to attack you.

Avoid encamping or bivouacking in graveyards. Get as far to windward of them as possible.

Avoid encamping on ground that has been encamped on before, and if obliged to camp near it, go to windward of the old site. Avoid all rivers with marshy banks, and marshes of every description. If obliged to camp with a small force for a day or two near a marsh, if possible place yourself so as to have a hill, or even some rising ground or woods, between you and it.

The water should be well tested, and the inhabitants questioned about it.

A grass country with a sandy or gravelly subsoil is the best; land with a clayey subsoil is damp; all brushwood should be avoided. Forests lately cut down are dangerous, particularly in hot or tropical countries. In temperate climates, if the country is well settled, and the people have a robust appearance, it is the best guarantee of the healthiness of the place.

There should be good natural drainage; ground sloping to the east or south is to be preferred.

The banks of running rivers are good, provided their edges are not marshy.

Sites on granite, metamorphic, clay-slate, and trap rocks are good. When, however, these rocks have become disintegrated, they are supposed to be unhealthy, and this rule has certainly proved true regarding Hong Kong and Kowloon.

Limestone and magnesian limestone are also healthy when there are not marshes, which are common in these formations; water there is good, but hard.

Chalk is good when unmixed with clay; water is pleasant and good. When the chalk is so mixed with marl as to become impermeable, it is damp, and likely to prove unhealthy. The permeable sandstones are very healthy.

Marching into Camp.—The position for the army to encamp in should, when practicable, be selected either the day before, or as many hours before the arrival of the troops as possible.

It is advisable that a staff officer and the F.O. of the day from each Brigade, a mounted officer from each battalion, and an officer and the Q.M. Sergt. from each cavalry regiment and battery, should gallop on with the A.Q.M.G. or senior S.O. of each Division when within a few miles of the ground, for the purpose of having the exact position that each is to occupy pointed out to them. Each of these officers should know the number of paces required for his regiment when in line. When they have marked where their right and left is to rest, any N.C.O.'s or orderlies that may have accompanied them being left on the ground, they should return to their

brigades or corps, noting in their minds as they do so the best roads or paths by which to conduct them to the position allotted to them.

As the troops approach their camping ground, they should form column; when halted—generally in *mass of columns*—on the ground they are to occupy, they will pile arms, take off packs, and if it is safe to do so, take off their accoutrements also.

Brigade majors having informed commanding officers of the strength and position of the piquets, they will at once be marched to their several destinations.

The regimental guards to be told off and mounted by the adjutant.

The remaining men to be told off as detailed in article on "CAMPS."

Q.M.G.'s Duties when Divisions encamp or bivouac.—The Q.M.G. or his deputy having pointed out to the senior S.O. of each division where his right and left are to rest, will tell them where the head-quarters are to be, detail the watering places generally for each division, inform them of the roads that require most watching, stating where they lead to, and the distances, &c., point out the villages or localities in front where the right piquet of each division is to rest, and state whether it is to be of cavalry or infantry.

The S.O. of the division having pointed out to each B.M. the line that is to be the front of his brigade will at once make the necessary arrangements as to the water supply. If the same place is to be for several divisions, an arrangement should be made between the S.O.'s of each as to the guards to be mounted, and the regulations to be enforced. He should take care that he has good open communications with the nearest main roads. The front should be cleared, or if too close with hedges, and the halt is only for the day, wide openings should be made in them, to be increased every day that the force remains stationary. The division head-quarters should be as near the centre of the division as possible, and indicated to the B.M.'s and the F.O. of the day.

The Brigadiers to take up a position as near the centre of their brigades as possible for their brigade head-quarters. The position of the commissariat to be pointed out to the officer in charge, also that of the Field Hospitals to the divisional P.M.O.

The senior S.O. after taking the General's orders will, in conjunction with the F.O. for the day, decide upon the number, description, and position of the piquets to be mounted. Having done so, he will inform the brigade majors of those that are to be furnished by each, indicating as nearly as possible the spot that each is to occupy. If the F.O. for the day is to be trusted, he may be allowed to dispose of them himself, but as a rule it is better that the senior S.O. should go with him, and see them properly posted. Brigade majors will therefore, upon receiving orders on this point,

detail the piquets and point out to the adjutants, as nearly as possible, the position to be taken up by each, going out himself with that one which is the most central as regards his brigade.

Assuming that the army is well protected from surprise by the outposts of the advanced guard, as a general rule, when a division is encamped in line with others upon its flank and rear, one piquet (a company) from each brigade will be all that is required. The system of piquets being first paraded and inspected by the adjutants on their regimental parade grounds, then by the brigade major on the brigade parade ground, then marched to the general divisional parade ground, and most likely kept waiting some time at all three places, before they are finally marched to the position they are to occupy for the night, is refined cruelty, and can lead to no good; it is a piece of stupid routine that is only suited for children. Soldiers hate being 'humbugged about.' The piquets should be detailed and marched off from their own parades in the direction of the place they are to occupy immediately when the division halts.

It is easy to tell an officer to move upon a certain village, rock, clump of trees, and wait there until the F.O. fixes upon the exact position for the piquet.

Leaving his junior to look after the camp, the senior S.O. must ride round the front, examining the features of the country, to as great a distance as time and circumstances will admit of. The telegraph wire will generally be laid down from the divisional or corps head-quarters to some point on the main line. Arrangements must be made for communicating by signaling with the outposts, or with any detached force in the vicinity which is not in telegraph communication with the main body.

At a certain hour in the afternoon, to be fixed by the chief of the staff, the senior S.O. of each division must be at his tent for orders for next day's march, or if halting, regarding the work to be done.

He will have to arrange for the transport of the sick to the nearest hospital in rear.

A staff officer from each division should visit the advance piquets and watering places of the several divisions every evening.

If halting for a day or two, a similar visit should be made at early dawn, when the piquets are being relieved. He should daily ride round the camps of the several corps to see that they are in good order, the latrines and cooking places made, &c., bringing to the notice of commanding officers and brigadiers all irregularities.

INTERNAL ARRANGEMENT OF CAMPS.—The site having been chosen carefully, it is taken for granted that the natural drainage is good. Although the camp had only been pitched with the intention of remaining there a day, circumstances may convert it into a residence for months; therefore from

the moment the tents are up, every exertion should be made to carry out all the works that are required in standing camps. Those that should be attended to by each individual regiment are as follows, each being placed in this list according to its relative importance:—

1. Tents to be neatly pitched according to order.
2. Cooking places marked out, and a kitchen constructed for each company.
3. Latrines dug.
3. A trench of 4 in. deep (the width of the spade) dug round the outside of each tent.
5. If the regiment is alone, make a watering place; if encamped as part of a division, this should be attended to by the A.Q.M.G.
6. The natural drainage so improved that all water flowing from the tents into the small drains round them should be led off by deeper drains into the nearest ravine or rivulet.
7. Make racks for arms in front of each company's tents.
8. Make paths with stones in front of each row of tents, &c.
9. Erect sentry boxes or shades.

FIRST.—In deciding upon the form of encampment, the following principles should be borne in mind:—

a. As a general rule, the frontage of cavalry and infantry encampments should correspond with the space covered by the regiments when deployed into line (allowance being made for intervals between corps), and the lines of tents should be on the prolongation of the squadrons or companies as they stand when in column.

b. That it should be formed to the reverse flank, when the line had broken into column.

c. Clear passages for guns and troops through the camps from front to rear should be provided for.

In marking out the front of the camp for a division, it cannot be expected that every corps should be exactly in alignment one with another, as the configuration of the ground must greatly influence it. When, therefore, it is necessary that the front of one battalion should form a salient angle with that of another, care must be taken to allow a sufficient interval between them in front, so that the regulated space shall be maintained all along the depth of both camps. When troops are encamped in two or three lines, from 200 to 500 yds. should be left clear between the rear of one line and the front of that behind it.

The space required for the encampment of a battalion of infantry on war establishments is a frontage of 320 yds. and a depth of 266 yds., when full distances between companies are allowed. This provides for a parade ground of 80 yds. in depth; but when the ground is restricted, this may be dispensed with, as also the space in rear of the baggage, so that a battalion may, when necessary, be easily encamped upon a depth of 150 yds. The

frontage may under similar circumstances be reduced to 120 yds., by having only 15 yds. between the rows of tents, instead of 40 yds. as shown in sketch. The interval between battalions or between a battalion and a regiment of cavalry, is 25 yds.; between artillery and the other arms, the interval is 34 paces.

The space required for a regiment of cavalry on war establishment is a frontage of 284 yds. and a depth of 436 yds. when encamped (as shown in sketch) in column of squadrons, and providing a parade ground of 80 yds. in depth. When space is an object the front can easily be reduced to 140 yds. and the depth to 336 yds., dispensing with the parade ground and closing up the baggage nearer to the officers' tents. Horses when picketed require a width of 6 ft., so when the available depth is much less than 336 yds. a cavalry regiment on war establishment should encamp in column of troops.

The B.M.'s having been pointed out by the A.Q.M.G. the line that is to be the front of their brigades, must make the necessary arrangements for any deviation from it which the nature of the ground may render essential, and will point out to the Q.M.'s of corps the exact spots where their right and left is to rest.

The regiments being formed in column, with an interval of 6 paces between the reverse flank of the strongest company or squadron and the front of the camp as marked out by the regimental Q.M.'s, the tents of each company or squadron will be pitched in line with them as they stand in column.

Each company and squadron to be told off into squads of whatever may be the number of men it is intended should be in each tent. The regulation number is 15 for a bell tent, so the squads will be generally of 14 privates and 1 N.C. officer each. The 14 privates to be divided into 6 tent-men, 2 woodmen, 2 watermen, 1 cook, with 3 for duty if required.

In the infantry arms will then be piled, and packs taken off (when at a distance from the enemy, accoutrements also), and hung upon the arms. In the cavalry as soon as the horse lines are marked out, the squadrons will file off to them, the men dismount, picket their horses, loosen girths, and remove bridles, placing them with their arms in rear of their respective horses. In the artillery the battery being formed in column of subdivisions with the waggons in rear of the guns, and at such a distance from them as will allow plenty of room for the horses at the picket ropes, the horse ropes will be stretched between the gun timbers and waggons, the horses will be unhooked and filed off to their respective places. Kickers and vicious horses should be picketed at some distance from others, each with a heel rope. The tents of each company or squadron, as they are taken off the waggons, will either be placed on the reverse flank of the arms by the quartermaster or distributed by him to the tent-men from one general pile.

It is of consequence that the same tents should always be given to the same company and same squads. The quartermaster, by pacing the front and

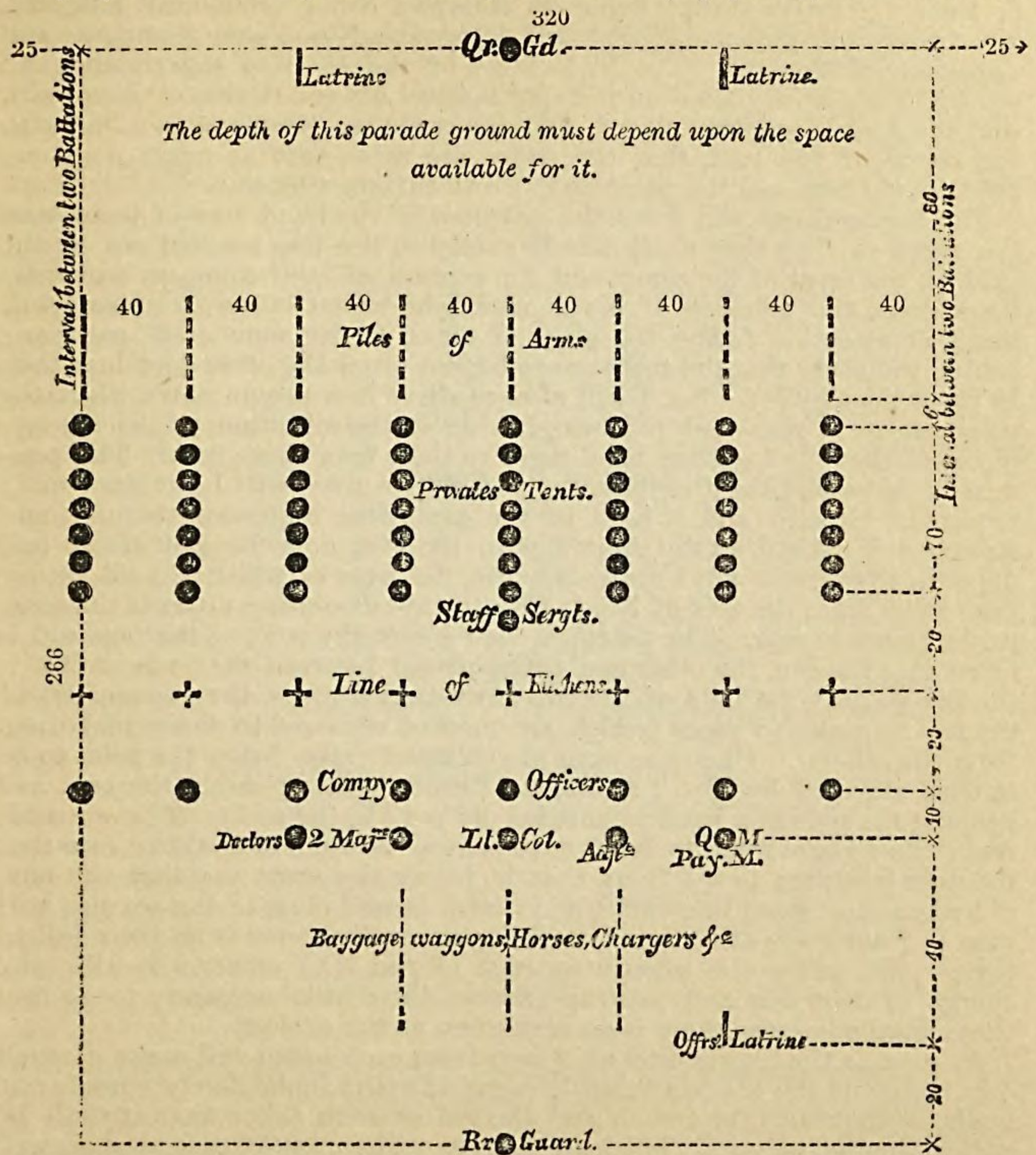


Fig. 17.—Camp of a Battalion of Infantry on War Establishment, at full intervals. Measurements given in yards.

flanks of the camp, fixes the position of each row of tents. The six men to pitch each tent are numbered off by the N.C. officer of the squad from 1 to 6, their respective duties being as follows: No. 1 front-rank poleman, No. 2 rear-rank poleman, Nos. 3 and 4 pegmen, Nos. 5 and 6 packers and unpackers of the tent. The N.C. officer of the party to superintend, and see that the pole is placed on the spot marked off for it, that it is upright, that the door is properly placed, that the cords are stretched in a line with the seams of the tent, that the slides are made fast at equal distances between the tent and the pegs, and also to enforce silence.

The senior major will dress the polemen of the front row of tents from the right so that they shall stand exactly on the line marked out by the Q.M. as the front of the camp, and the captain of each company will from them dress the polemen of his squads, who whilst being so dressed will stand at attention facing the piles of arms, at the number of paces one behind the other that the tents are to be, one from the other (not less than 10 paces if possible). No. 1 will at once drive in a peg to mark where the pole is to rest; rear-rank polemen, having in the meantime joined the two pieces of the pole together, hand them to their front-rank men. The pegmen at the same time distribute the pegs where they will be at hand when required. Nos. 5 and 6 have in the meantime unpacked the tent and stretched it out flat on the ground, with the tent door hooked across and uppermost, when it will form a triangle, the base of which should be one pace away from the feet of No. 1, with the apex pointing towards the companies' tents in rear. The polemen then insert the pole, so that one end is fitted into the cap, the other end being placed between the heels of No. 1, the two pegmen get hold of the two front-angled ropes, the two packers of the two rear-angled ropes (which are marked with red to distinguish them from the others). Upon the word of command 'raise tents,' the poles to be at once elevated by Nos. 1 and 2, the former getting inside the tent and keeping the pole in a vertical position by putting the end of it between his feet; the 4 angle ropes to be at once pegged down, No. 2 taking care that the door is square to the front, that is, facing the same way that the men did when they stood in column, and that it is well closed; the pegmen will then peg down the other ropes, working gradually round from their left to their right, under the superintendence of the N.C. officer who will take charge of tent bag and mallets. I have thought it necessary to go into these details because there is no regulation on the subject.

As soon as the tent is pitched, 2 men from each squad will make a trench 4 in. deep and the spade's breadth round the tent immediately outside the walls, so that both the trench and the sod or earth taken from it shall be within the line of pegs. The knapsacks or valises, as the case may be, will then be removed into the tents, being placed where the head of the owner of each will rest when sleeping. If *tentes d'abri* are used instead of bell-

tents, the same plan of camp is to be adhered to. Although it is more convenient to have the tent doors facing the same way that the men do

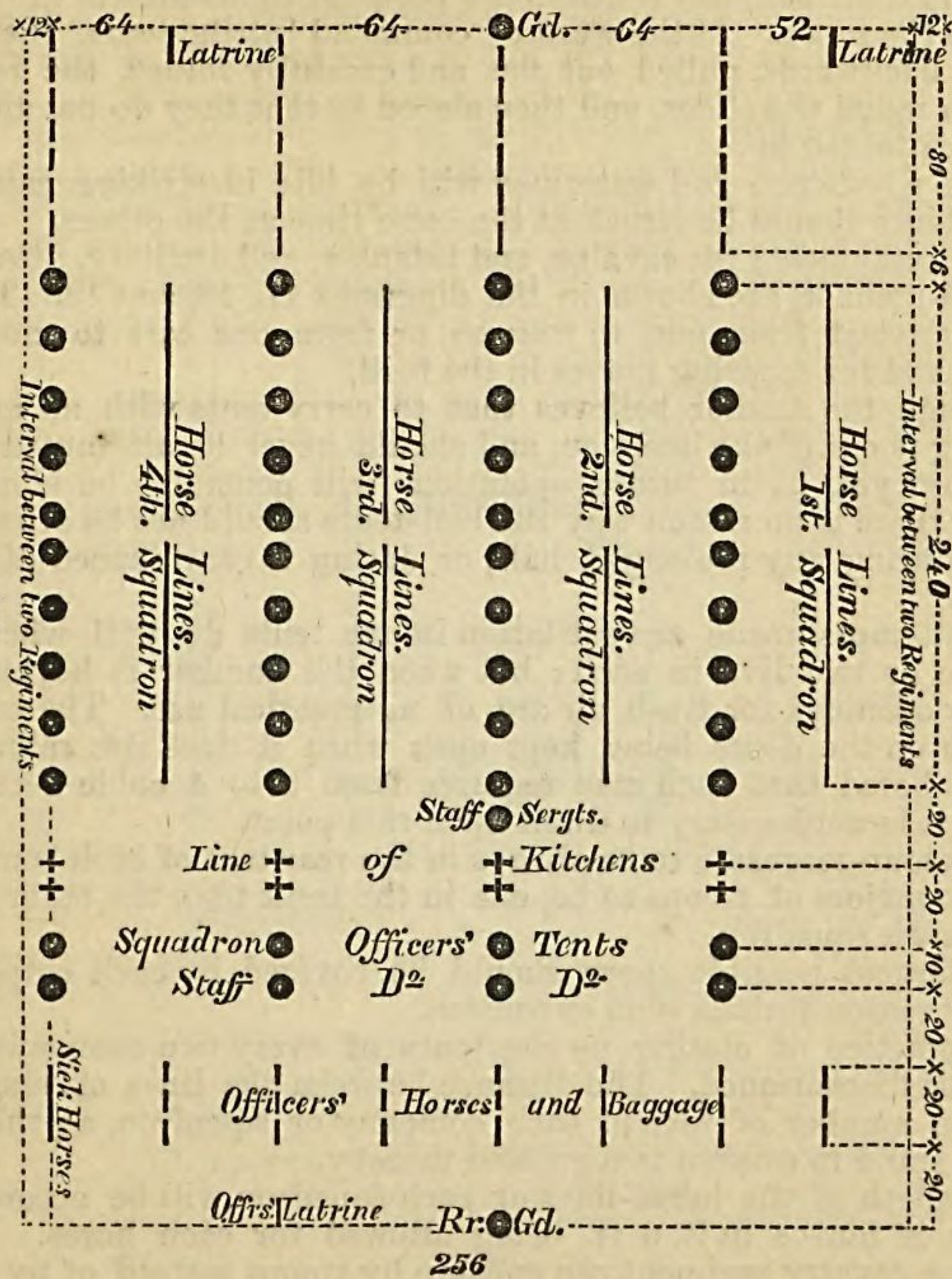


Fig. 18.—Camp of a Regiment of Cavalry on War Establishment. Measurements given in yards.

when standing in column, yet it is very easy to change them if the prevailing winds or the rays of a tropical sun renders that position objectionable.

In striking tents, the front-rank man gets inside the tent, No. 2 closes

the door, and keeps it closed until the tent is struck; the 4 other men pull out all the pegs except those of the 4 angles. The pegs to be collected and put in their bag, the remaining 4 pegs are to be drawn, the men holding on to the ropes. At the word of command 'strike tents,' they are to be lowered backwards, pulled out flat and carefully folded, the ropes being rolled up round the slides, and then placed so that they do not appear when the tent is folded up.

As the woodsmen and watermen will be idle in striking camp, all the officers' tents should be struck at the same time as the others.

The encampments for cavalry, and infantry, and artillery, after the most approved manner, are shown in the diagrams 17, 18, and 19. The plan of ropes stretched from gun to waggon, or from one cart to another, is the best method for securing horses in the field.

Although the Author believes that to carry tents with an army whilst marching is out of the question, and should never be attempted when near an enemy, yet, as in future, operations will generally be along lines of railway, there is no reason why the bell-tents should not be always at hand for use during any prolonged halt, or during a continuance of inclement weather.

The attempts made at ventilation in our tents do well when no more than one or two live in each; but when the number is beyond a dozen, the tiny openings for fresh air are of no practical use. The only plan is to insist on the doors being kept open when it does not rain. When it is remembered that each man requires from 3 to 4 cubic feet of air per minute, it is unnecessary to dwell upon this point.

The colour-sergeants to be always in the rear tent of each company: the sergeant-majors of troops to be, one in the front tent, the other in the rear tent of each squadron.

The largest possible space should be covered by each corps when no military reason forbids such expansion.

The practice of closing up the tents of every two companies together should be discontinued. The distance between the lines of tents, depends upon the number of files in each company or squadron, as the distances as they stand in column is regulated thereby.

The length of the horse-lines of each squadron will be according to the number of horses in it, 6 ft. being allowed for each horse. If space is limited, a cavalry regiment can encamp by troops instead of by squadrons, the regiment being formed up in open column of troops; the tents will be pitched as for infantry, the horse-lines being between the rows of tents.

In pitching the tents, disturb the ground inside and around as little as possible. Do not allow absurd notions of order and regularity to cause tents to be pitched in hollows which are frequently met with in the best sites,

when by moving the tent perhaps a few feet one way or another, a good position for it might be found.

In camps of position where tents and not huts are used, it is advisable to supply planking for the men to lie on, these planks to be removed and aired

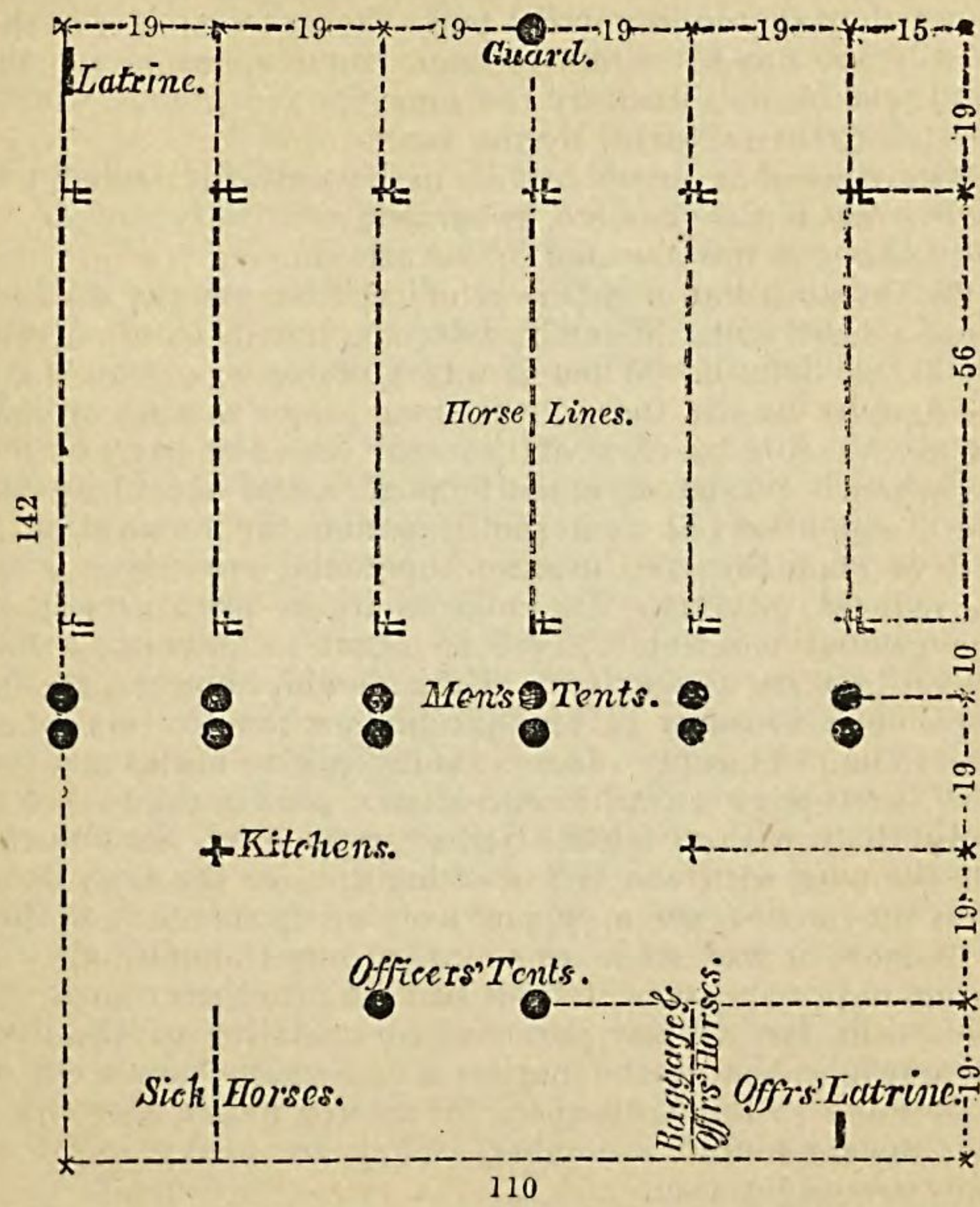


Fig. 19.—Camp of a Battery of Artillery on War Establishment. Measurements given in yards.

every fine day. If boards cannot be had, use any sort of tarpaulin or waterproof sheet that can be obtained.

If straw is plentiful, issue enough to make good thick mats for the men

to lie on; they are easily made, and most comfortable; they should be hung up to dry every day. They should be 3 in. or 4 in. thick, 6 ft. long, and 2 ft. 3 in. wide at widest end, curved outwards to fit the tent, and tapering gadually down to a point.

Every morning, except when it rains, have the sides of tents rolled up all round, and in fine weather strike tents frequently; it is good practice for the men; they should regularly pack them up as if for the march. This is also advisable as a sanitary measure, for the ground where the tent usually stands can be well dried by the sun.

Do not permit grass or green leaves to be used for beds in tents, but serve out straw when it is possible, to be used as already stated.

The Circular tent is the one used in our army.

During the Crimean war numbers of officers dug out the interior of their tents, leaving a small pillar of earth under the tent-pole, of about a foot at top, and 18 in. at bottom. When it was possible to obtain a good stout spar of the desired length, the pole in two pieces was discarded, and the pillar cut away, placing the foot of the spar (the new pole) on the bottom of the excavation. A ledge of about 9 in. all round the inside of the tent was also left, which served as a shelf, so that the excavation was only about 11 ft. in diameter; the interior superficial space was consequently very much reduced, although the cubic contents were greatly increased, as also the general comfort. There is an art in pitching a tent, which camp life soon imparts to soldiers. They should, however, go through an annual course of instruction in tent-pitching, when the matter should be explained to them. In sandy places it is difficult to keep tents standing in a high wind, as the pegs draw. Large stones, pack-saddles, &c., should be used to fasten the ropes to; bushes buried in the sand, the branches pointing towards the tent, with one left sticking up over the sand to fasten the rope to, form the most secure means of keeping tents erect, as they form a species of anchor; a flat stone or piece of wood should also be placed under the tent-pole, to prevent it from sinking into the ground.

We have now in our military stores a bad imitation of the French *tente d'abri*, which fulfils few of the purposes for which they were originally designed; so much so that bell-tents for a force weigh about the same as our shelter tents for a similar number. They are heavy, and the buttons and holes are wrongly placed.

Previous to retiring for the night, all the tent-ropes should be slacked off a little, as the rain or dew will tighten them enough to draw the pegs, and strain, if not tear the canvas. At night and during wet weather all the arms should be replaced in the tents, and fastened with a string round the tent-poles.

2nd. COOKING PLACES.—Each company should have its own kitchen in

rear of, and in line with its own row of tents. The simplest kitchen consists of a trench dug in the direction that the wind is blowing, of such width that the kettle, when placed on it, should not rest above an inch on each side; when Flanders kettles are used, the width should be 9 in.; its depth should be 12 in. at the end from which the wind is blowing, and continue that depth for 4 ft., decreasing then gradually to 3 in. at the opposite end, where a space must be left equal to the breadth of the trench, to serve as a chimney. For a company on war strength, two such trenches will be required, each 10 ft. long. The fire is lit at the end where the trench is deep; it should not extend beyond 3 or 4 ft. up the trench. The kettles are placed touching one another along this trench; dry sods should be used to stop up the chinks made by the roundness of the kettles, so that the space under them may form a flue. It is advisable to pile up sods, or, with stones and earth, to erect a chimney of at least 1 ft. in height at the end away from the fire. All grass round the fire-places should be cut to prevent accidents from fire.

If the force halts for more than one day, these kitchens are susceptible of great improvement; the chimney can be made of mud or wattle and daub, and the draught may be increased by using short pieces of hoop-iron as bars, stretched across the trench to support a filling in of clay round each kettle, or, in other words, to make a regular place for each kettle, into which it will fit exactly, so that its position may be frequently changed, to prevent the contents of one being cooked before the other. As the day following the wind may change to an exactly opposite direction, a similar trench must be dug in continuation of the former one, the same chimney being used. In this manner the same chimney will serve for trenches cut to suit the wind blowing from all four quarters. The openings from these trenches into the chimney must all be closed with a sod, except the one to be used when the fire is lit. In some places, where bricks or stones suitable to the purpose are to be had, it is better to construct these kitchens on the ground instead of below the surface.

In well-wooded countries like America, two logs rolled together in the direction of the wind, the fire being kindled between them, make a good kitchen. In such places fuel is no object, so the construction of chimneys can be dispensed with, and the kettles hung from a stick resting at each end on a forked upright.

Near the cooking-places, a small *filth-hole* should be dug as a receptacle for all cooking refuse, potatoe peelings, &c.; the old one to be filled up with the earth well rammed down over it, and a new hole opened every two or three days.

Firewood should be cut into lengths of 1 ft. and about 2 in. square. When nothing but gorse or brushwood is to be had, the trench must be

deepened where the fire is lit. Damp or very sappy wood should be avoided. Bones can be used when other fuel is not to be had.

Field Ovens.—The simplest method of making them is as follows. Take any barrel (the more iron hoops on it the better), the head being out; lay it on its side, having scraped away the ground a little in the centre to make a bed for it; or if there is a bank near, excavate a place for it, taking care that the end of the barrel does not reach within 6 in. of the edge of the bank. Cover it over with a coating of about 6 or 8 in. of wet earth or thick mud, except at the open end, which is to be the mouth of the oven. Pile up some sand or earth to a thickness of about 6 in. over the mud, arranging for an opening 3 in. in diameter being left as a flue (to increase the draught) to lead from the upper side of the barrel, at the far end, through the mud and earth. This flue is only left open when the fire for heating is burning; when the bread is put in it should be covered over. Form an even surface of well-kneaded mud at the bottom within the barrel, to form a flooring to place the bread on. Light a fire within the barrel, and keep it up until the staves are burnt. You will then have a good oven of tough burnt clay, tied together by the iron barrel-hoops. When required for use heat it as if it was an ordinary oven; when the ashes are drawn out and the bread put in, close the mouth with some boards or a piece of tin or iron from a case in which preserved potatoes or other perishable stores have been issued. These ovens were frequently used during the Red River expedition, and answered admirably.

3rd. LATRINES.—As soon as the place has been marked out for them by the regimental quaatermasters, they should be commenced by fatigue parties. Those constructed at first should be 2 ft. wide at top and 1 ft. at bottom, 2 ft. deep, and about 12 paces long. The earth, as it is dug out, should be thrown so as to form a bank to the rear and sides, sods and any large stones on the spot being used to rivet the inner faces of the bank.

If the force halts for more than one day, latrines on a larger scale must be constructed: they should be 6 ft. deep, and 1 ft. wider at top and bottom than the smaller ones. If possible, a rail or post of some sort should be erected along the edge for the men to sit on, it should be 18 in. above the ground, and can be supported by forked posts at the ends; another should be laid on the ground for their feet to rest on. If trees or brush are in the neighbourhood, it can be inclosed by a screen about 4 ft. high, and if time permits, roofed in also. Twice a day, about 10 A.M. and 6 P.M., the bottom of each pit should be covered with a 3-in. layer of dry earth, not sand; the wood ashes from the cooking-places should be spread about in the vicinity, particularly where the men's feet rest within the inclosure. If lime is to be had, it should be used in large quantities. C.O.'s should hold their quartermasters strictly responsible that these duties are carried

out efficiently. The work will generally be done by defaulters; and it is advisable that the same sergeant should always have charge of them, so that he may be conversant with these duties, taking his orders daily from the quartermaster. When a latrine becomes nearly full, it should be carefully filled in with earth well trodden down, but having a small mound over the spot to mark it.

The health and comfort of every one in camp depends very much upon the manner in which these duties are conducted.

4th. DRAINS ROUND THE TENTS; they have been described already.

5th. WATERING PLACES.—If there is, or likely to be, any scarcity of water, sentries must be posted over the wells or streams from which it is drawn, and it should be laid down as a rule, that the captain and subaltern of the day on duty in each battalion, must visit during their tour of duty the sources from which water is supplied to their men, to see that no irregularities take place there. Immediately that troops reach the ground where they are to encamp or bivouac, water guards must be told off, and orders issued by the A.Q.M.G. for their guidance: in many places such guards should be commanded by officers.

If the supply is from a running stream, the greatest care must be exercised to prevent men from washing clothes, or bathing in it above the point where the drinking water is to be drawn.

Two points should at once be marked off: above the first, water for drinking and cooking to be drawn; between the two, horses and cattle to be watered; and below the second, all washing and bathing to be carried on. This is an arrangement of the first importance, both for health and comfort.

When positions are to be occupied for any length of time, these regulations are of still greater moment. In many instances the water supply is from springs, which require nice care to make them answer all purposes. Before Sebastopol our water supply was from springs and a few wells; before we left the Crimea some of our watering places were models of their kind. Small reservoirs were made to catch and hold the supply that ran off during the night, so that every gallon of water that the spring gave was made available: from these reservoirs all the water for drinking and cooking was drawn, and the overflow passed off into a series of half barrels placed close one beside the other, with a little tin gutter connecting each, so that the overflow from each barrel filled the one next below it, the fall being just sufficient to allow for this. Say you have twenty-five of these half barrels well built up with loose stones below, fifty horses can water there at a time, five-and-twenty horses at each side of the row of barrels. Horses, mules, and bullocks drink about $1\frac{1}{2}$ gallons at a time, and take about three minutes each in doing so. The overflow of the lowest barrel is again

collected in a reservoir for washing clothes, &c. An officer should invariably accompany all cavalry watering parties, and instructions should be given that each horse as soon as he has drunk should leave the water, and the party should fall in at a little distance clear of the next comers.

Such watering places must have at least one or two sentries always on duty by day and one by night, to see that the orders regarding them are strictly carried out. They should be visited every day by the majors of brigade, and by all the regular staff officers of the division, also by the field officer and provost sergeants. These barrels should be well charred inside; the more frequently the process is gone through the better. When the same watering places are used by one or more divisions, increased care is necessary, and mutual arrangements must be made on the subject by the generals concerned. One frequently meets with springs from which the supply is small and difficult to obtain. Dig these out a few feet, and insert a cask charred inside, perforated all round with holes (half-inch), and from it the water may be drawn easily. If animals are to be watered at very shallow streams, dams should be constructed to deepen them, as animals drink more rapidly when the water is about 4 or 5 in. deep.

When wooden troughs are constructed, they should be strongly fixed in cradles or trestles backed with stone: their bottoms to be about $2\frac{1}{2}$ ft. above the ground: they should have a width of $1\frac{1}{2}$ ft. at top, with a depth of from 8 to 12 in.: 120 ft. is a good length for them.

FILTERS.—Two barrels, one inside the other, having a space of 4 or even 6 in. clear all round between them filled with layers of sand, gravel, and charcoal, form an excellent filter. The inside one, without a bottom, rests on three stones placed in layers of sand, charcoal, and coarse gravel: the water flowing or being poured into the space between the two, and having thus to force its way through these substances into the inner barrel, becomes purified. If the water is a small spring gushing up out of the earth, the two barrels may still be used, but the outer one must have the bottom well perforated with holes, and the inner one having the bottom in, and being pierced with holes round its sides near the top, through which the water, having risen from the

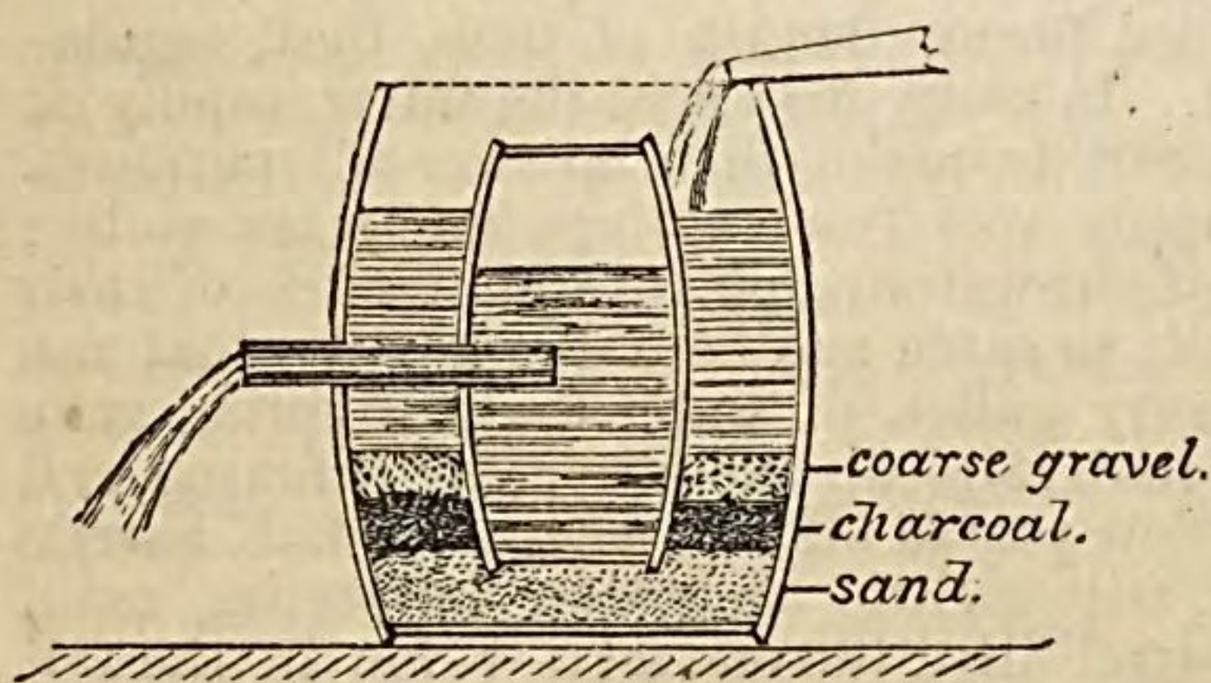


Fig. 20.

bottom of the outer barrel (by the holes pierced there) through alternate layers of gravel, charcoal, sand, and moss, passes into it clear and pure.

In both these filters the water should be drawn off by means of a pipe running through the outer into the inner barrel. For these filters animal charcoal is the best. When, after a time, it ceases to act, it should be removed and well dried. It can then be used again to advantage. It is impossible to use too much of it. Marsh water is most injurious. In India, well water should always be used in preference to that from tanks or jeels.

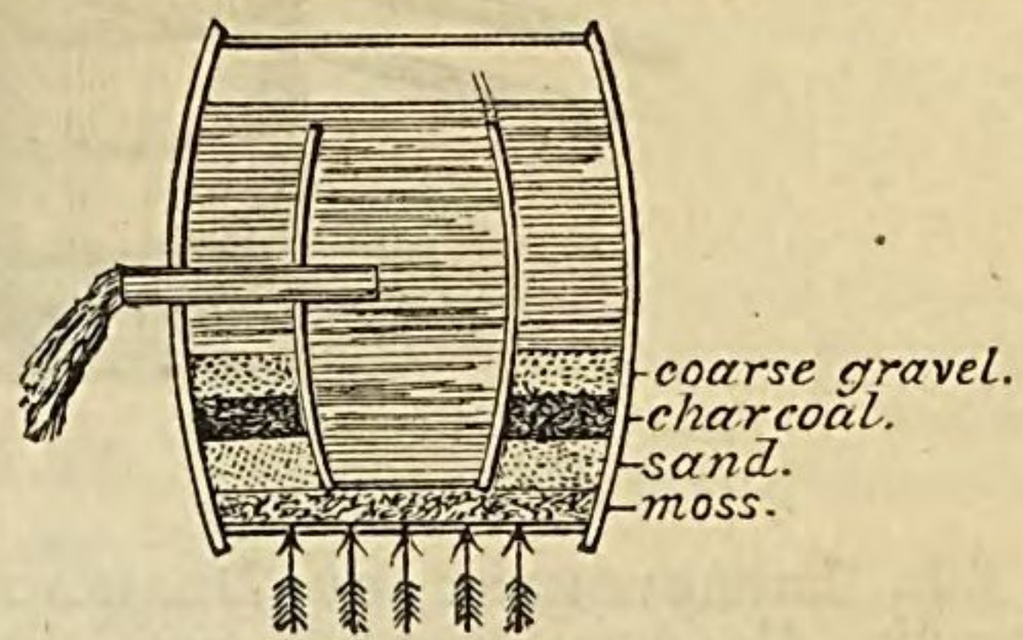


Fig. 21.

There are three kinds of pumps generally used for military purposes.

1°. A small hand, lift and force pump with flexible hose, this will draw water from 18 feet, and throw it about 16 feet, working with a lift of 18 feet and a throw of 7 feet (the height of an ordinary water cart); it will yield 7 gallons per minute.

2°. The Norton tube well. This consists of tubes driven into the ground with a monkey, and with a pump screwed on the top. One of these wells takes about three hours to fix. It will yield about 7 gallons per minute, and will keep three horses drinking at one time. *These pumps are very useful in searching for water.*

3°. The 'Bastier Pump' is a pump with an endless change, working over a wheel; it yields, from a depth of 45 feet (worked with two men), 2200 gallons per hour.

If the water supply is from wells, troughs must be provided for the animals to drink out of.

Water barrels.—For the conveyance of water when troops are stationary for any time, the following simple contrivance is very useful: Bore a hole 2½ in. in diameter through the sides of a small barrel, and pass a stick of the same size, made of hard wood, through them, so that it may project about 6 in. on each side. This hole should be about 6 or 8 in.—according to the size of the barrel—from its open end. Two poles about 5 ft. long, having iron staples driven into them at the centre, are used for carrying it, by passing the projecting ends of the stick through the staples. When iron staples cannot be had, a lashing of small rope or stout cord may be substituted. Two men can thus easily carry a large quantity of water about a camp. See accompanying sketch.

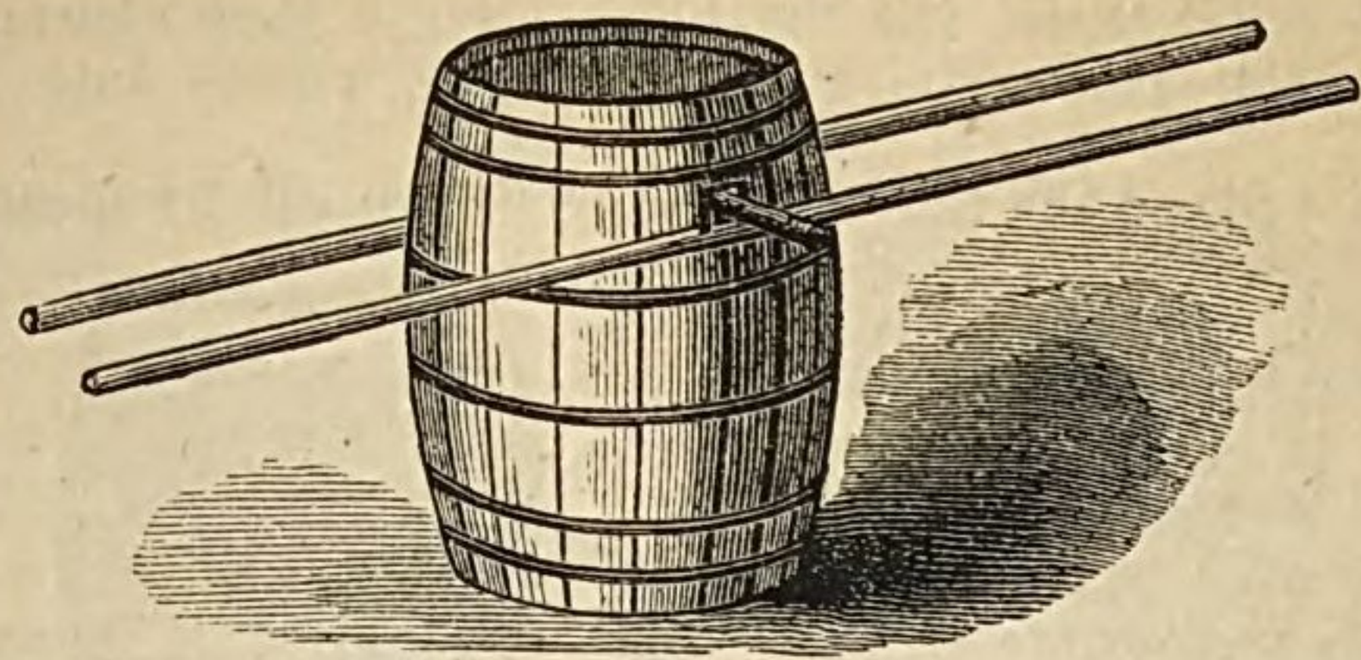


Fig. 22.

6th. IMPROVEMENT OF DRAINAGE.—The longer the camp remains standing the more complete ought the drains to be made. Wherever it is necessary to construct large ones, bridges must be made over them opposite the intervals between the regiments. Large flat stones can be used to make a covered-in drain, or barrels sunk, and covered over with small stones and clay well rammed in round them, answer well.

7th. RACKS FOR ARMS.—These should be made where the arms were piled as the regiment stood in open column. They are easily made by driving in two forked sticks, one at four paces from the front tent, the other at from 20 to 25 feet from it, according to the strength of the company. They should be about a couple of feet in the ground, and just so much above it that, when joined by a bar on top, it should be 3 ft. 6 in. high. In this bar nicks should be made at intervals of 4 in., those on one side being opposite the centre of the spaces between the nicks on the other side If wood is plentiful, lay a rail on the ground at each side at 1 ft. 6 in. from the uprights, cutting nicks to correspond with those on the top bar. These rails should be picketed down to insure them from slipping. Upon them the butts of the rifles are placed in the nicks, the muzzles resting in the nicks of the top bar. Stones neatly arranged will do well to rest the butts against where wood is scarce. Forked sticks, 6 or 8 ft. long, connected by a top bar, should be placed in front of the tents, to hang wet clothes on, to dry blankets, &c. In countries where pine or spruce is to be had, young trees should be cut down, and the branches lopped off to within about 6 in. of the stem. About 6 ft. of such a tree, sunk near each tent door, forms the best possible rack to hang belts on.

8th. STONE PATHS.—These add greatly to the comfort of troops in camp, especially in wet weather, and lend an air of neatness and cleanliness to the place which is very desirable. Stones should be collected by defaulters.

Any old wine cases, old barrels or bags, or a hurdle, will supply the place of hand-barrows. Paths should be made in front of each row of tents, in front of the camp, round each flank to the latrines, along the kitchens, &c.; fascines or hurdles, or corduroy work (see Article on "CORDUROY ROADS") can be used advantageously when stones are not to be had.

Defaulters should be employed upon the conservancy of the camp. All refuse matter from the kitchens and all dirt near the tents must be collected, and either burnt or buried in places to be especially marked off for that purpose.

9th. SENTRIES' BOXES OR SHADES should be constructed in all standing camps, to shelter sentries from sun and rain. They are easily constructed with hurdles; or if shade from the sun only is required, a few branches, interlaced and fastened to a pole driven into the ground, forms an umbrella-like protection that will answer the purpose well.

When encamped for several days in any one spot, it is very necessary that all the *rubbish and dirt* from the camp should be carried daily to a spot selected for the purpose, and there burnt: defaulters should be employed upon this duty.

DAILY ROUTINE OF DUTIES IN CAMP.—The officers for daily duty in camp, in addition to those in charge of guards, are to be a general or generals of the day, according to circumstances and the strength of the camp. In large camps there is to be a lieutenant-general of the day, and a major-general of each wing, or one major-general of cavalry, and one of infantry, and majors of brigade in the same proportion, a F.O. per brigade, a captain and subaltern of the day per regiment, and an adjutant and Q.M of the day per brigade.

The general of the day is to superintend the regularity and discipline of the camp in every particular; he is to visit the guards, and the outposts (unless the latter have been placed under the command of some particular officer); he is to call out and inspect the inlying piquets as often, and at such times, as he thinks proper; he is to receive all reports from guards and outposts, and make immediate communication of any unusual occurrences to the general in command.

The F.O. of the day has the general superintendence of the camp of the brigade; he is to be present at the mounting of all the brigade guards, which he is to visit by day and night. The inlying piquets are always to be considered under his command; he is to call them out, to inspect them, to order such patrols from them as he may judge necessary to insure the regularity and order of the camp, and, in the event of their being ordered out of camp on any duty, he is to accompany them.

The captain of the day is to superintend the cleanliness and regularity of the camp of his own regiment; to attend the parading of all regimental guards; to visit them by day and night; and to report everything extraordinary to the commanding officer.

The subaltern of the day assists the captain in his various duties, and reports to him any irregularity which may come to his knowledge.

The brigade adjutant of the day is to assist the B.M. in the various details of it, and in the absence of the B.M. is to receive and execute all orders; it may frequently be necessary for him likewise to attend for orders at headquarters.

It is the duty of the brigade Q.M. of the day to attend to the cleanliness of the camp, and take care that all broken glass and filth of every kind are removed, for which the Q.M. of each regiment is responsible as far as the camp of his regiment is concerned.

The officers on duty and those in waiting as next for duty, who are always to be named in orders, must never be absent from camp. No officer, without special permission from his general, must sleep out of his camp.

On the arrival of a division or brigade on the ground destined for its camp, the quarter and rear-guards of the respective regiments are to be mounted immediately, and the advanced piquets, if circumstances require them, posted. The grand guards of cavalry are next to be formed, and the horses picketed. The tents are then to be pitched; and until this duty is completed, the officers are on no account to quit their troops or companies, or to employ any soldier for their own convenience.

General officers are not to leave their brigades until the tents are pitched and the guards are posted. They are to encamp with their brigades, unless quarters can be procured for them in the immediate vicinity.

Camp followers and retainers of an army in the field are subject, equally with soldiers, to the provisions of the Mutiny Act and Articles of War.

Every encouragement is to be given to the people of the country occupied to supply the camp markets; and any soldier ill-using, molesting, or attempting to defraud them, or to exact anything for their free passage to and from the camp, is to be summarily punished in the most exemplary manner.

All foraging parties, and those employed in carrying water, or collecting fuel or straw, are to be attended by a N.C.O. from each troop or company. If a party exceeds twenty men, and is to march any considerable distance from camp, it is to be under the command of a subaltern officer.

The troops of every branch of the service are at all times to be kept in readiness to turn out at the shortest notice. It is expected that in half an hour from the time the troops receive the order to march, either by day or night, the army shall stand formed at the head of its encampment, with baggage packed, and the whole force prepared to move. This state of preparation is equally essential in cantonments and in camp; and in both the troops are to be accustomed to march without any previous notice.

Regiments encamped near villages are to send frequent patrols into them to apprehend any soldiers who may be there without passes, or who, having passes, may behave improperly.

Plundering and marauding are, and ever have been, considered highly disgraceful to soldiers, and unworthy of civilised troops. These offences are, therefore, at all times and in all places, to be promptly and rigorously repressed, and it is to be considered an imperative duty on the part of all officers and non-commissioned officers to interfere, and endeavour to the best of their ability to put a stop to any proceeding of the kind.

All general officers are, as soon as possible, to make themselves acquainted with the nature of the country in the vicinity of the camp, with the roads, passes, bridges, and defiles, &c., and particularly with the outposts; so that in the event of the general officers being ordered suddenly to support or defend any post, they may be able to march without waiting for guides, and be competent to form the best disposition for the service. They are to instruct their As.D.C. in these particulars, and always to require their attendance when they visit the outposts.

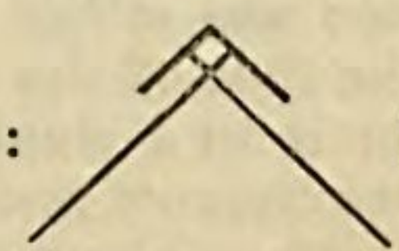
An intimate knowledge of the theatre of action, and its neighbourhood, must be of the greatest advantage to every officer, but more particularly so to general officers, and others in important commands. By maps, acquired local information, and unremitting activity and observation, they will attain this important knowledge, which will enable them to act with decided advantage against an enemy. Guides may be of service in the common operations of marches; but near the enemy the eye and intelligence of the principal officers must determine the movement of troops, and enable them to seize and improve every advantage.

Huts.—In positions intended for permanent occupation, or at bases or temporary bases, the men ought to be hutted.

In a sanitary point of view, the ground should never be excavated, nor earth piled up against the sides of the huts.

Arrange the flooring so that there shall be a current of air under it, and, if possible, have it fastened down with screws, so that it can be removed frequently. This is a most essential point if the huts are intended for lengthened occupation, and are laid on the ground without much previous preparation.

If no planks can be had for flooring, it is a good plan to pave the portion not covered with beds, so that it can be swept several times a day. If this cannot be done, then remove about 2 in. deep of the earth every four or five days, putting down dry earth or sand in its place. Ashes from wood fires are a good substance to use.

Arrange for ridge ventilation thus :  If the men suffer from cold, issue extra blankets and other clothing, which it is taken for granted can always be done where troops are hutted, but keep open the ventilators.

That known as the Gloucester hut, made to hold twenty-four men, and heated by a stove, is about the easiest to put up with unskilled labour. It is 28 ft. long, 16 ft. wide, 6 ft. high at the eaves, and 16 ft. at the ridge. It can always be made in England, and sent out with printed instructions as to the matter of putting it together. To make the roofs water-tight, good tarpaulins, or the coarsest description of calico well tarred over, lasts much better than felt, which latter was issued in the Crimea and was a failure.

These huts are the best, without doubt, if they are intended for a hospital in rear of an army; but if it is intended to hut for the winter an army actually in the field, or to hut an army of occupation, it is perhaps better to send out material and allow the men to hut themselves. If this is done, the best plan of hut is that 32 ft. long, 16 ft. wide, and 6 ft. high, from sleeper to wall-plate, to hold 28 men. Two huts should be put end on one to the other, a gable between them being built of brick or stone, with one chimney serving for the two fire-places, which latter should be large. For these huts the doors with hinges and the windows should be sent out ready made. The material should be scantling, of two sizes: 1st, 2 in. $3\frac{1}{2}$ in. thick and 16 ft. long, for sleepers, wall-plates, uprights and joists; 2nd, $1\frac{1}{2}$ in. × 3 in. thick and 11 ft. long, for rafters, ridge-poles and braces. Rafters of that length will give the roof a good pitch. Such a hut would require, for two sides and one end and gable, $40\frac{3}{4}$-in. planks 16 ft. long and 11 in. wide; this would allow for their lapping $1\frac{1}{2}$ in. one over the other. For the roof, $48\frac{1}{2}$-in. planks 11 ft. long. The nails required would be $2\frac{1}{2}$ in. for the sides, 2 in. for the roof, and clout nails for the tarpaulins on roofs. The cubic space in huts should be 400 cubic ft. per man.

Previously to erecting these huts, the ground should be levelled. Place the sills, when possible, on a foundation of small stones. Except in the tropics, the doors should, as nearly as possible, face the mid-day sun. In cold climates the doors should not be on the side exposed to the prevailing wind.

Most comfortable huts were made by many of our officers in the Crimea and by the Sardinians for their men, according to the following plan. A space the size of the intended hut was dug out $2\frac{1}{2}$ ft. deep. Gables were then built of mud or stone, or made of boards or wattle and daub: a door in one, and in the other a window formed by a wooden packing case, with the bottom knocked out of it. The gables should be 2 ft. wider than the excavation, so that when the roof is put on a ledge will be left all round to serve as a shelf. The fire-place was either made of brick or mud, or sometimes was merely cut out of the face of the earth, forming one of the side walls, a flue being bored from it in a slanting direction, so as to come up out of the ground clear of where the roof rested on it, and was there provided with a chimney about 2 ft. high. The huts made after this plan by the Sardinians, to contain 6 infantry soldiers, were 14 ft. 3 in. long, and 7 ft. 1 in. wide in the clear. The roofs were made of strong rough rafters, supporting hurdles covered with a layer of about 6 in. of mud well mixed up with dry grass or straw. If the mud is well tempered in this manner, it resists heavy rain for a long time. The Tartars roof their houses so, and indeed it is common throughout the north of China. These huts can be greatly improved by adding a wall of 2 ft. all round, taking care to leave a space of 1 ft. between it and the edge of the excavation. If brushwood is very plentiful, the walls may be made of wattle, the uprights being 18 in. apart.

The pitch of roof in all roughly constructed huts should be at an angle of 45°.

Our troops made good shelter for themselves in the Peninsula by half cutting through a long branch of a cork tree, so that its ends reached the ground: by placing other branches cut for the purpose against it, and interlacing them with others, a good wigwam was soon made.

Log Huts.—In woody countries like America good huts to last for years are quickly made of logs placed one over the other, being notched half their respective thickness at the angles, so as to fit one into the other. Moss is driven into the interstices. A roof is put on of split logs gouged out in the centre, so that each is like a long curved gutter. A layer of these is placed side by side, with the hollow side uppermost, one end resting on the ridge pole, the other on the walls. A second layer is put over them, with the hollow side down. A large split log, well hollowed out, is used as a ridge piece. Bark taken in long strips from a tree makes good roofing or sides for a wigwam.

Cow-dung is an invaluable material for huts in the field. If mixed with water, and well plastered over mud walls or floors, it renders them hard, tough, and less subject to injury from weather. A thin coating of this applied every day to the earthen floors of huts adds much to the look of cleanliness which is so essential to comfort. Those who have served in India know how largely it is used by the natives there for cleansing their earthen floors and cooking places.

In all standing camps it must be remembered that the surface ground round the huts or tents quickly becomes saturated with filth. It should be scraped once a week, and the ashes from the kitchens, or some sand or clay, spread in its place. The surface earth thus scraped off should be buried.

HUT STABLES.—Rough sheds with clap-boarded roofs are the best; with the litter and some wet earth, good walls can soon be constructed round the shed; these walls should be vertical on the inside, but with a good slope towards the outside. Sheds made 30 ft. wide, can accommodate two rows of horses, their heads being turned towards one another. Plenty of openings must be left for doors by which to remove the horses quickly in case of fire, and drainage must be well attended to. The stalls, or standing space per horse, should be 5 ft. wide and 9 ft. long.

Billets.—In future wars against civilised nations, our troops must either bivouac or be billeted in towns and villages, as they were in fact during our campaigns in Spain and France at the beginning of the century. In estimating the amount of accommodation afforded by any building or town the following rules may be safely followed.

"*Accommodation*," implies the occupation of a town, village, or house

for short periods in time of war: it should, therefore, be stated what is the *maximum* number of men who can be accommodated consistently with good sanitary arrangements.

The regulation for permanent accommodation in barracks at home is at the rate of 600 cubic feet of air per man in barracks, and 400 cubic feet per man in huts. This allowance of space may, however, be regarded as unnecessarily large for a time of emergency. The following is a rough method for calculating the number of men who can be accommodated in a room; it will generally be found sufficiently accurate for practical purposes:—

For rooms 15 feet wide or under, one man to every yard in length.

For rooms over 15 feet in width, but under 25 feet, 2 men for every yard of length.

For rooms 25 feet wide, 3 men for every yard of length.

If the accommodation is only required for a short time, the 'pace' may be substituted for the 'yard' in these calculations, and if it is only required for the one night, and the accommodation is limited, 24 in. will suffice.

As it will be impossible for an officer to visit every house in a town or village, the best plan to adopt will be to divide the houses into classes as far as possible, and by carefully examining a house of each class and estimating the number of men which it would accommodate, arrive at a fair estimate of the accommodation afforded by the total number of houses.

A certain number of rooms (usually those on the upper storey) must be left for the inhabitants, and provision must be made for cooking.

If any calculation be made, based upon the actual number of inhabitants, it must be borne in mind that the houses of country gentlemen or large farmers will usually afford proportionately a much larger amount of accommodation than the houses of the poorer classes.

As regards horse accommodation, in all good stables a horse is allowed from 1200 to 1400 cubic feet of space, but this allowance may be considered excessive for a time of emergency; when stalls exist, the number of stalls may be taken to represent the number of horses which can be accommodated. In the case of barns or large outhouses, about 5 feet of their length should be allotted to each horse.

If two divisions are to be billeted in a town, the particular locality that each is to have should be told off to it by the Q.M.G. or other S.O. belonging to army head-quarters. It is a good plan to have a main street for the demarcation between the two, as it prevents disputes. The A.Q.M.G. or senior S.O. of each division should again divide his portion into two, for his two brigades, to be sub-divided again for each corps and department. The guns and their waggons should be parked in some open square, their horses being stabled as near them as possible. Cavalry had better be near the outskirts. Generals, brigadiers, and commanding officers

of all sorts, should, as nearly as possible, have their quarters in the centre of their command, and it is to be clearly understood by all, that under no circumstances will individuals, of any rank whatsoever, be allowed to take possession of quarters unless they have been duly given over to them. The control department should be established in a suburb, or on the outskirts, so that their waggons and animals can be parked outside in the nearest fields. This holds good with siege and every other description of trains. It is essential that all these allotments be made before the troops march into the town, for which purpose the A.Q.M.G., with an officer from each department and from the personal staff of each general officer, should precede the troops on the march by at least two or three hours.

The officer charged with this duty, upon arriving at the city or town in which the force is to be billeted, will at once call upon the mayor or chief magistrate, for the purpose of making the necessary arrangements with him, to be enforced by his authority and the local police.

It is advisable to do this, even in an enemy's town, as long as any recognised magistrate remains in it.

If a plan of the town is to be had from him, it will facilitate matters greatly.

Each officer employed upon this duty should have a piece of chalk, and mark with it, upon the doors of the buildings, the name or number of the corps to which it has been apportioned.

The street or quarter told off for each battalion, &c., must then be subdivided into portions for each company, &c., by the officer of it who accompanied the A.Q.M.G. in advance, and notes made in his pocket-book describing the locality, so that he can find it again easily. If the town has been abandoned by its inhabitants, the streets, squares, and principal houses should be named, their names being affixed to them in a legible manner as soon as possible.

Finger-posts, pointing to the head-quarters, general hospital, commissariat, &c., should be erected. The main guard should be as near the centre of the town as possible; other guards must be posted at the several main exits. The provost establishment will be at the main guard, and all the police duties carried out under the immediate orders of the provost-marshal, with whom no one shall interfere.

Alarm posts must be assigned to each corps, where they will be halted upon first arrival, and where they will parade daily during their stay in the place.

The officers of the staff must see to the general *conservancy* of the town, making corps keep clean their own particular localities.

They will also see to opening out communications, so that when the force marches it may have numerous exits, and that troops and trains billeted in rear of the place, or in the suburbs, should be able to get upon the main line of advance, without going through the city.

Bivouac.—Napoleon preferred the bivouac to tents for men, and there can be no doubt that it is more healthy in fine weather, particularly when operating in a wooded country where fires can be maintained easily. No tents being used adds greatly to the mobility of an army. Englishmen rather shudder at the notion of life without any protection from wind, rain, and dews, because they naturally take a gloomy view of the weather, but after the first few days' experience, most soldiers like it.

In selecting a site for a bivouac, wood and water are, as for camps, the great requisites, but a good supply of the former is more essential for the bivouac than for the camp, as it is robbed of half its enjoyment, unless the men can have large fires to sleep near. This is all the more essential if the nights are cold. In cold weather, woods are the warmest place for a bivouac. In tropical climates it is pleasanter at night to bivouac in the open. The sanitary principles that apply to the selection of camps, hold good in choosing the site for a bivouac; dry and sheltered positions should be selected.

Cavalry should wheel into open column of squadrons, picket their horses, and each man sleep in front of his own horse. Infantry having wheeled into column should pile arms, and sleep as they then stand in the ranks, the officers in both instances sleeping on the reverse flank. The artillery having picketed their horses and placed the guns, waggons, &c., as if for a camp, should, like the cavalry, sleep opposite their horses.

A few logs of wood, sods of grass or turf, or stones piled up to windward, afford good protection, and add greatly to comfort. If there is time and material at hand, shelter, after the backwoodman's fashion, should be made by driving into the ground forked sticks, 4 or 6 ft. long, and resting a pole between them: branches should then be laid against it to the windward side at an angle of 45°, bark or smaller branches being laid over them again until a good shelter is obtained. In doing this, remember that the thicker ends should always be placed uppermost, the leaves being, as it were, upside down; they will throw off the rain better in this manner. Little pent houses made so are most comfortable when slept under with a good fire at one's feet. If sufficient straw or leaves cannot be found, a hollow should invariably be scraped away for the hip to rest in. The small boughs of the American hemlock, laid with the stalks down, form a luxurious bed.

Men sleeping together should always club their blankets, so as to have one to sleep on, the other being over them. Too much attention cannot be paid to making the sleeping place comfortable. Unless men get good refreshing sleep they cannot sustain continued work. The company officers should be most energetic in this matter, for a little trouble bestowed in collecting dry grass, shavings, &c., may prevent your awakening some two hours before daybreak, chilled with cold, so that you cannot get to sleep again. Always contrive to have something to serve for a pillow. The writer

has frequently made use of his sword-hilt, a log of wood, or a stone, and slept most soundly.

When one wakes in the morning, the limbs feel a little stiff; take a smart run, and the blood will soon begin to circulate quickly, whereas they who crouch down over their fires feel cold a long time.

Campaigning.—A great object with officers should be to keep those committed to their charge in good health. Without it, nothing can be accomplished. There are precautions to be taken, and rules to be attended to—the result of experience—which it is now disgraceful in an officer to be ignorant of. Were an officer commanding a regiment in any future war to order his men to dig large holes and pitch their tents in them, as was done by a genius before Sebastopol, a court martial would be justified in finding him guilty of the murder of those who died in consequence.

Under the heads of Camps and Positions I have noted down the sanitary points that should be attended to. I shall now merely state a few general rules.

Change the positions of camps as frequently as possible. When at a distance from the enemy, scatter divisions, regiments, and even individual tents as much as possible.

The mind and the body must both be attended to: each reacts upon the other. If the man is not well fed, well clothed and housed, the privations must soon tell upon his disposition and his temper. The result can only be sickness and uselessness. See that your officers and men have something to eat and drink before they begin their work, no matter how early. A cup of hot coffee and a biscuit is a good morning meal before the regular breakfast.

You cannot pay too much attention to cooking: try to get the men's rations varied as much as possible, and see that no opportunity is lost of buying vegetables for them. Never hesitate to report at once any improvement that strikes you as feasible and advantageous. If you find that the meat ration is not sufficient, report it at once.

Get your men hot meals when possible. If preserved or cooked rations have been served out, and there is time, they should be warmed or made into soup or bouilli before being eaten. This is of great consequence after a long march, or a day of hard fighting. Save your men when you can, as you would your horse; they will be all the more fit for a great effort when you require them to make it. Reduce the number of your sentries as much as possible. The most ignorant man knows the advantage of creature comforts to the efficiency of the soldier; but we are prone to regard our soldiers as machines, merely requiring a certain amount of bread and beef, washed down by a gill of rum, to keep them not only in motion, but in perfect order. We are only now awakening to the necessity of developing their moral qualities. A man without hope makes an indifferent soldier; but one without good spirits and cheerfulness is worse than useless. Strive

then, by all possible means, to develop—to create, if necessary—the high moral qualities of human nature in those serving with you.

The powers of a weak man, endowed with hope and lofty courage, are always of greater service to the State than those of a great strong fellow who is discontented and desponding.

Employ officers to superintend all large fatigues, and associate them with the men in all their work. Often have I blushed for my profession, when I have seen officers sitting down under some shelter reading a book, whilst their men were working, or rather, I should say supposed to be working; for after a little time, when the men see that their officers do not take an interest in what is going on, they soon follow suit.

Officers in command of regiments and brigades cannot be too strict in such matters, and any staff officer who fails to report or take notice of such irregularities is unfit for his position.

Care should be taken that each soldier has a housewife; and when time permits, attempts should be made to have them instructed in the art of mending their clothes, and even their boots.

In the field no man's hair should exceed half an inch in length; this is essential for the well-being and cleanliness of soldiers. It can only be carried out successfully when the officers of regiments and departments set the example. None except those who have worn their hair after such a fashion can appreciate the luxury it confers on service. No man can have that smart bearing, which is the outward mark of a soldier, who allows his hair to be so long that he can part it. A well-cropped head is the first great step towards cleanliness. The beard and whiskers should be cut close about once a week. Hair is the glory of a woman, but the shame of a man. Want of cleanliness is a sure source of disease at all times, but especially so when a large number of men are living together in crowded tents.

If a camp is stationary for even a week in any one locality, endeavours should be made to provide a washing place for the men, where there shall be abundance of water: they should be encouraged to wash themselves all over in cold water, whenever opportunities offer for doing so. It is of the utmost consequence that the feet should be washed frequently.

It is difficult to wash clothes during a campaign, but it can really be dispensed with for a long time without injury to health: linen or cotton shirts should not be used in the field; two good flannel shirts of a greyish colour are ample for all ranks, if worn day about; when the shirt is taken off, it should be hung up, stretched out, and exposed to the sun and wind. It should be shaken and beaten with a small stick, or well brushed. The same rule applies to trousers or drawers, when such are worn. Washing soon ruins flannel and all woollen materials.

Never allow your men to be uselessly idle, but let them see that the work you keep them at is for their own benefit. At once give up the humbug of

the barrack square, and its aimless exercises. Practise your men in marching. The army that can march best, is the best army, and the regiment that can march best in an army, is the best in that army.

As for drill, in respect to the battalion and brigade evolutions required during an action, the worst militia regiment can do enough for all practical purposes, and by imparting useful information to the soldier, and by practising him daily in exercises corresponding as nearly as possible with the work to be done when engaged with the enemy, his mind can be as effectually, and certainly more usefully disciplined, than by the constant repetition of the showy parade movements described in our Drill books.

The running drill has been a glorious innovation. What really fatigues and disgusts soldiers is the time that is dawdled away in parades. If the division at any of our camps at home is to go through a field day, think of the time that elapses between the fall in being sounded on regimental parades, and when the division is called to attention by the general officer.

Commanding officers new to war try to carry out the routine of home service in the field; it requires a man of good judgment to select those rules that can never be relaxed, and for negligence of which men should always be punished, from the others that should not be enforced.

If men have good regular hot meals, and are comfortably warm at night, they never become discontented by hard work. See article on "CAMPS," for details of the work to be done. Two days in every week at least regiments should march from five to ten miles, attention being paid to the advice laid down under the article on "MARCHES." Regular work and good food will get Englishmen into training, so that they can do anything.

There can be no doubt that all the diseases of cholera, dysentery, diarrhœa, scurvy, typhus, and malarious fevers, which have been the scourge of armies from the earliest days to this time, have arisen from bad or insufficient food, impure air, bad water, overcrowding in tents or huts, and the misery and depression of spirits ensuing from these evils.

The men's boots and socks to be frequently inspected, so as to be certain that they are always in a fit state for a march. If these points are carefully attended to, your men will go into action fit for work.

Once there, and having been taught the truth of the distich 'fire low, fire slow,' the English officer may confidently count upon victory.

Cooking.—In permanent camps it is desirable to establish regular coppers or boilers for cooking. When possible, 3 pots should be provided for each company: one for meat or soup, to hold 1 quart per man; one for vegetables, to hold 3 pints per man; and one for tea, to hold 1 pint per man. When only one cooking vessel is available, its minimum capacity should be 3 pints per man.

Calculating losses for cutting up, bones, cooking, &c., the soldier does not get more than half the weight of his meat ration to eat.

BOILING meat entails a loss in weight of about 30 per cent. The water should not be hotter than 160°, if hotter, the meat becomes hard and shrunken; the lower the temperature the better are the nutritive juices kept in. The larger the pieces of meat the better. Put the meat into boiling water, let it boil for 5 minutes, and then reduce the temperature of the water, either by pouring in cold water, or by reducing the fire until it is about 160° Fahr., that is, as hot as the finger can be put into without scalding. Allow a quarter of an hour for every pound the meat weighs.

ROASTING.—The loss is a little less than in boiling. The meat should be exposed at first to a great heat, for the purpose of keeping in the juice. Allow a quarter of an hour a pound.

RECEIPTS FOR COOKING.

Meat Soup.

16½ lbs. meat.	¼ oz. pepper.
1 lb. onions.	5 oz. sugar.
1 lb. flour.	Small faggot of herbs.
5 oz. salt.	3⅓ gallons water.

Separate the *large* bone from the meat, also the gristle, cut the meat into pieces of about 4 oz., take 8 oz. of the fat, and chop it up, slice the onions, put the fat in the boiler; when melted, add the onions, stir them well, so that they do not get brown; in five minutes add the meat, which keep stirring and turning over for five minutes longer: the meat ought to be warm through; then add the boiling water by degrees, let it simmer gently for one hour, mix the flour with cold water very smooth, add it to the soup, with the salt, pepper, sugar, and herbs; simmer gently for thirty minutes, keep stirring it to prevent the flour from settling at the bottom.

The great error commonly committed in making soup is doing it too rapidly, which renders the meat hard and tasteless. Bones and scraps of meat should be collected after every meal, and put down to simmer for next day's soup.

Irish Stew.

16½ lbs. meat.	6 oz. salt.
16 lbs. potatoes.	1 oz. pepper.
4 lbs. onions.	½ lb. flour.

Cut the meat away from the bone, and then into pieces of ¼ lb. each, the loin and neck of mutton into chops, disjoint the shoulder, and cut the blade-bone into four pieces (if the leg, cut into slices) ¾-inch thick, rub them with the salt, pepper, and flour, and place the meat in the boiler with some fat, brown it on both sides, then add the onions whole, and then the potatoes, and enough water to cover the potatoes; stew gently for two hours, keep the fire down and well covered during the cooking.

Beef and Mutton Pudding.

16½ lbs. meat.	½ oz. pepper.
6 lbs. flour.	Sweet herbs.
1 lb. onions.	Water.
2 oz. salt.	

Cut the meat from the bone and sinews, take away 1½ lb. fat for the paste. Cut the meat into pieces of ½-inch thick, and rub it with half the salt, pepper, chopped onions, and herbs; place it in a large dish, or five small basins, with a little water. Then make the paste as follows:—Place on the table the flour, make a hole with the hand in the centre, then place in it the chopped fat, salt, and pepper, then put some water in the hole, gradually stir the flour into it until all the flour is moistened, and it forms a stiff paste; work and roll it well for two minutes, let it remain as a ball for ten minutes, roll it out to the thickness required, put a piece of paste round the inside of the dish or basin, and cover it with the paste, taking care that the edges are properly joined together, or the gravy will boil out. Steam the large puddings for two and a half hours, and the basins for two hours.

How to soak, and plain boil, the rations of Salt Meat.—To each pound of meat allow half a pint of water, or a pint if handy; do not let the pieces weigh more than 3 or 4 lbs. each. Let them soak about eight hours, or all night if possible. Wash each piece with your hand to extract as much salt as possible; it is then ready for cooking. If less time is allowed, cut the pieces smaller, or parboil the meat for twenty minutes in the above quantity of water, which throw off, and add more. Simmer gently for three hours, and serve. Vegetables or dumplings can be boiled with it.

Salt Meat, to prepare hurriedly.—Warm it slightly on both sides—this makes the salt draw to the outside—then rinse it well in a pannikin of water. This process is found to extract a great deal of salt, and to leave the meat in a fit state for cooking.

How to stew Fresh Beef, Pork, Mutton, and Veal.—Cut or chop 2 lbs. of fresh beef into 10 or 12 pieces; put these into a saucepan with 1½ teaspoonful of salt, 1½ teaspoonful of sugar, ½ teaspoonful of pepper, 2 middle-sized onions sliced, ½ pint of water. Set on the fire for ten minutes until forming a thick gravy. Add a good tablespoonful of flour, stir on the fire a few minutes; add a quart and a half of water; let the whole simmer until the meat is tender. Beef will take from two hours and a half to three hours; mutton and pork about two hours; veal one hour and a quarter to one hour and a half; onions, sugar, and pepper, if not to be had, must be omitted; it will even then make a good dish; ½ lb. sliced potatoes, or 2 oz. of preserved potatoes; ration vegetables may be added, also a small dumpling.

For a hurried dinner, cut your rations into pieces about the size of a penny, but three or four times thicker. Skewer them on a piece of iron wire, or hard stick: a few minutes will cook them if hung before the fire.

Vegetables must be carefully washed and cleaned from insects. Green vegetables should be boiled fast in plenty of water, and drained at once when done. They sink when sufficiently cooked. *Potatoes* take from 20

to 30 minutes boiling; they show signs of breaking when they are done, which can be ascertained by sticking a fork into them. *Carrots and parsnips* take from 20 to 45 minutes boiling. Young nettles, sweet docks, turnip-tops, or the young leaves of mangel-wurzel, make good green food. A little pepper and salt should be added to season them. Dandelion leaves, especially when young, make a most agreeable salad. *Dried and compressed vegetables* of all kinds should be soaked from 4 to 6 hours in pure water, and then boiled slowly; if there is any bad taste from putrefaction having commenced, a little chloride of lime will remove it. The '*mixed compressed vegetables*' should be boiled in a little water for about half an hour; *the cabbage* to be boiled in sufficient water for half an hour, the *carrots and turnips* to be boiled for about 15 minutes, potatoes to be boiled in sufficient water for half an hour. Rice should be washed and soaked, and then boiled in plenty of water, *without salt*, for 20 or 25 minutes, then some salt should be thrown in, and the water drained off. Each grain will then be separate.

To make Tea.—If possible, it should be made in a vessel used solely for that purpose; on service this is generally impossible, but it renders great care on the part of the cook all the more essential. Before the tea is made the kettle must be well washed, and heated with a little hot water and well rinsed. The water for the tea should then be put in, and boiled before the tea is put in; care to be taken that the water is boiling fast when this is done. If possible, the boiling water should be poured from one kettle into another containing the dry tea. The lid should then be put on, and the pot placed beside (but not on) the fire for 4 or 5 minutes before serving it out. Much depends upon the softness of the water; if the water is hard, add when possible a small teaspoonful of soda, to the camp kettle full (for 5 men each).

To make Coffee.—The same rules apply, as regards cleanliness and the description of water, as in making tea. Sometimes there is only time to prepare it by boiling; but if possible, it is better to heat the coffee in the lid of the kettle, then put it in a kettle, and pour the boiling water on it, leaving it to stand near the fire for 5 minutes, when it will be fit for use. When there is time to do so, it should be strained through a cloth of some sort. When made, the dregs should be collected and well boiled; if this decoction is poured over fresh coffee, the result of the second making will be found strong and aromatic. To clear coffee some cold water should be poured in from a height. The cold water sinks through the coffee, and carries down the suspended particles.

Plum-Pudding.—Put into a basin 1 lb. of flour, ¾ lb. of raisins (stoned, if time be allowed), ¾ lb. of the fat of salt pork (well washed, cut into small dies, or chopped), two tablespoonfuls of sugar or treacle; add a half pint of water, mix all together; put

into a cloth tied tightly; boil for four hours and serve. If time will not admit, boil only two hours, though four are preferable.

Plum Rice Pudding, in which no eggs or milk are required.—Put on the fire 12 pints of water in a moderate-sized saucepan; add to it when boiling, 1 lb. of rice, or 16 tablespoonfuls; 4 oz. of brown sugar, or 4 tablespoonfuls; 1 large teaspoonful of salt; the rind of a lemon thinly peeled: boil gently for half an hour; strain the water from the rice, keeping the rice rather dry.

The rice-water is then ready for drinking, either warm or cold. The juice of the lemon may be introduced, which would make it more palatable and refreshing.

Add to the rice 3 oz. of sugar, 4 tablespoonfuls of flour, and half a teaspoonful of pounded cinnamon; stir on the fire carefully for 5 or 6 minutes; put it in a tin or a pie-dish, and bake.

By boiling the rice a quarter of an hour longer it will be very good to eat without baking.

This will produce 5 lbs. of pudding, 6 pints of most wholesome beverage. The lemon and cinnamon may be omitted, and it will still make palatable pudding and good beverage; the latter is admirable for sick men, particularly for those suffering from diarrhœa.

Lemonade.—Peel thinly the third part of the rind of a lemon, put it into a basin with two tablespoonfuls of sugar; cut the lemon in two, lengthways, and squeeze out the juice over all; stir round for a minute to form a syrup; pour in a pint of water, mix well, remove the pips, and it is ready for use. If you can strain it through a clean cloth, so much the better; 1½ tablespoonful of lime juice may be used instead of the lemon.

Diet.—To be considered here under two conditions: when on the march, i.e. marching five or six days in the week; and when halting temporarily in camps.

When marching continuously the men reach camp very hungry, and consequently hurry on their cooking as much as possible; the result is that their dinners are generally indifferent, as there is not time to make good soup. Officers commanding regiments would do well to have all bones and scraps of meat remaining after the men have had their dinners collected and put down to simmer together, with some small portion of the ration reserved for that purpose, so that all should have a good basin of soup at about 4 or 5 in the afternoon. The ration of meat might, in fact, be increased a quarter of a pound with great advantage, whilst the men are doing hard work; the best fleshy parts used at dinner, and the bony portion reserved for the evening soup.

Diet is now a science, and the recent discoveries in it have had the effect of removing the old, stupid, and, I may say, cruel notions regarding the system for training either men or horses. The appetite of men taken from quarters, placed under canvas, and marched daily, increases considerably

for the first few days; meat that would be indigestible from toughness whilst living in barracks, is eaten with appetite in the field; $1\frac{1}{2}$ lb. of fresh meat (bone included) is by no means a large ration for men whilst marching continuously. A man of average size and activity will, 'under ordinary conditions of moderate work, take in 24 hours from $\frac{1}{25}$th to $\frac{1}{20}$th of his own weight in solid and liquid food,' 'the solid being to the liquid as 1 to 2.' The daily ration should be varied as often as possible, for men tire of the same food day after day; the greatest possible variety ought also to be made in the mode of cooking it.

Give your men as little spirits as possible; in most countries tea and coffee are much more sustaining and more portable. If in countries where light wines are plentiful, induce your men to drink them (nothing beyond 15 per cent. alcohol being used); they are good anti-scorbutics, and scurvy is the one great disease to guard against in war.

The old superstition that 'grog' is a good thing for men before, during, or after a march, has been proved by the scientific men of all nations to be a fallacy, and is only still maintained by men who mistake the cravings arising solely from habit for the promptings of Nature herself. It is the commonest thing to see men, even when travelling at home, taking brandy 'to keep them warm.' It is an ascertained fact, that alcohol of any sort reduces instead of increases the temperature of the body.

The use of spirits in cold weather has been well tested during the various polar expeditions, the medical officers of which all condemn it as a preventive against cold.

No men require greater endurance than the trappers of British North America, and none do a greater amount of hard physical work than the voyageurs and lumbermen there; none of whom drink spirits when in the woods; tea being their constant beverage. Our armies in Kaffraria had no spirit issued to them as a rule, and no army in the field was ever more healthy (if any other ever was as free from sickness). Our experience in the Indian mutiny also carries out this theory; for months in some places our men were entirely cut off from all liquor, and they were healthier than when subsequently it was issued to them as a ration. By increasing the allowance of tea, and abolishing that of rum, you diminish the supplies to be carried to a great extent, whilst you add to the health and efficiency of your men; their discipline will improve as their moral tone is raised, engendering a manly cheerfulness that spirit-drinking armies know nothing of. No men have ever done harder work than was performed by the troops employed upon the Red River expedition; no spirits of any sort were issued to them, but they had practically as much of good tea as they could drink: illness was, I may say, unknown amongst them. The use of rum has been so long the custom in our armies, that it is difficult now to discontinue it. It can only be effected by a cheerful co-operation on the part of the officers. If

the men do not receive rum, and have not the power of buying it, the use of wine in camp by officers should be given up. It is humbug for an officer to lecture men about drinking, advising them against the use of spirits, and then go to his tent to be merry over a bottle of sherry. Wine, with the officer, holds the place of rum with the private; and although the bottle of wine may do the former no harm, he ought cheerfully to go without his luxury, when he compels those under his orders to forego theirs; feeling that his conduct is for the good of the service should amply compensate him for the privation. As the allowance of baggage to which officers are entitled has now been reduced to a minimum, they will not have power to carry about luxuries such as wine with them.

Dr. Parkes recommends that after the evening meal, the tea-leaves should be heated again in sufficient quantity of water to enable the men to fill their water bottles for the next morning's march.

Officers in command of companies should impress upon their men the danger to which they expose themselves in drinking bad water. Poisonous matter of many descriptions may be taken into the stomach in it. In Algeria, leeches have in this manner been frequently taken into the body, causing dangerous internal bleeding.

There can be no doubt as to the injurious effect upon the health produced by impure water. Dysentery and diarrhœa ensue from drinking it, and in the opinion of the best army surgeons, it is one of the chief causes of those fearful diseases which have devastated armies in so many wars. It has lately been proved, that if bad water does not produce cholera, its use predisposes the body to take it when it is prevalent.

Bread should always be issued, when possible, in preference to biscuit.

We are too fond of issuing salt meat to our men. Doing so saves the commissariat trouble, so that department is in consequence always desirous of serving it out. Except under peculiar circumstances, it should not be issued during marches, as it creates thirst. It is much easier to drive live cattle than to carry great hogsheads of salt pork on waggons.

It is to be regretted that, during peace, salt provisions are not served out once a week to our men all over the world, in order to accustom them to cooking and eating them.

Medical and Surgical Hints.—On all outpost and detached duties hours, if not days, may elapse before the services of a doctor can be procured: the following hints may therefore be useful.

Bleeding from Wounds is from a vein or artery: from the former it is seldom of much consequence; it is distinguished by the dark colour of the blood; it requires merely the application of cold water and the slight pressure of a bandage either over the wound itself or between it and the upper extremity of the injured limb: the limb should also be raised to a higher level

than the body. In all cases of bleeding the first consideration is to put the wounded man in a recumbent position: this is imperatively necessary in all serious cases. A man unconscious from loss of blood, will often revive at once when placed on his back with his head on a level with his body.

Bleeding from an Artery is known by the bright red colour of the blood and by its spirting out in jets corresponding with the beats of the pulse. Unless stopped at once, the wounded man must die. To do so it should be remembered that it is only necessary to compress the injured artery against the bone between the wound and the body. Having placed the man as described above, feel for the pulsating artery on the inside of the limb above the wound, and when found keep up a steady pressure with the tips of the fingers, which will control the bleeding; two men, one relieving the other every few minutes, can stay it for a long time in this manner. The pressure should be in towards the bone. If a tourniquet is to be had, apply it just above where the pressure of the fingers is found to control the bleeding. A silk or cotton handkerchief twisted tight by means of a stick passed through the slack, is a good substitute, a bullet or round stone being placed over the artery.

The inside seam of the coat or jacket follows the general course of the arteries in the arm. If the wound is in the leg, the artery can be easiest found in the groin, from whence it passes down the inside of the thigh, winding round underneath to the hollow behind the knee. If wounds are below the elbow or knee, the pressure should be applied above those joints. If you cannot find the artery, fill up the wound with some cotton or linen, and bandage as tightly as you possibly can directly over the wound. Bleeding from gunshot wounds is generally slight at first. I have seen limbs cut off by round shot, when there was really no bleeding at all; still, precautions are always necessary, and a man with an artery cut should never be left for a moment without some one by him. The edges of sabre wounds should be brought together and sewn, or well secured with sticking plaster. *In removing the wounded from the field*, or to carry them on the march when you have no ambulance or stretchers, construct a framework with two poles 8 ft. long, leaving 6 in. at each end as handles: lash 3 short pieces across, so as to keep the poles $2\frac{1}{2}$ feet apart, one piece to come just behind the man's head, one at his feet, and one in the centre; to this a blanket is securely fastened at each corner, and along the sides, if there is time to do so. A wounded man can be carried very comfortably in this manner.

If a leg is fractured, place the man on his other side, and place the injured leg exactly over the other, with any soft material that may be at hand between them, and then bandage both legs firmly together; thick wisps of straw with thin sticks or twigs added to increase the support, placed lengthways along the broken limb, and bandaged tightly to it, is a good plan with either broken arms or legs.

Broken arms should be encased between two pieces of board, and sup-

ported in slings. A man with a fractured limb should have these precautions taken for him before he is removed. Stimulants must be given, diluted with plenty of water: taken pure, they are dangerous.

In malarious countries three grains of quinine taken daily is a good preservative against fever.

Emetics.—A charge of gunpowder dissolved in water is a good and safe emetic, or two tablespoonfuls of mustard in warm water followed by large quantities of the latter. The strongest emetic is 10 grains of bluestone (sulphate of copper), or 20 grains of sulphate of zinc in water, followed by copious draughts of warm water.

Burns and Scalds should be at once covered with cotton wool, or plenty of lint, to keep them from the air, oil being first freely applied to the injured part.

Rheumatism.—Equal quantities of ammonia, or spirit of turpentine and sweet oil well rubbed on with the hand, is good. If the following ingredients are to be had, mix up in equal quantities (say half of an ounce), sulphur, nitre, flour of mustard, Turkey rhubarb, and gum guaiacum: take a teaspoonful in a wine-glassful of water every alternate night.

Sore feet from marching should be bathed at night in tepid water, having a few lumps of alum dissolved in it: if there are blisters, they should be pricked with a needle or sharp knife, but the skin must not be torn off. Previous to beginning the next day's march the tender places should have soft soap applied to them, or if it is not to be had, any sort of grease. Whisky or rum and water applied to the feet is the best preventive against blisters.

Sunstrokes.—In countries where such are to be feared, never allow the men to become exhausted, let them eat and drink frequently in small quantities. Let the hat be thick, and covered with white. In the tropics nothing but large turbans can be safely relied on as a protection against the sun. In cases of sunstroke, open the coat and everything bearing on the throat; if plenty of water is to be had, keep up a stream of it on the head until consciousness has been restored.

POISONS.—Cases of poisoning in the army are generally caused by strong irritants, such as nitric, sulphuric, muriatic, or oxalic acids, corrosive sublimate, and caustic (nitrate of silver, or by sedatives and narcotics, such as morphia, opium, Indian hemp (bang), prussic acid, &c., or by arsenic or strychnine. The following remedies should be adopted in the absence of a medical officer:—

Nitric acid.—Give at once lime water, or chalk, magnesia, or carbonate of magnesia in water. In the absence of all these, scrape the walls if white-washed, or mix up some plaster from the ceiling with water and give it at once. Soap suds is also good if other means are not at hand. Then give a

spoonful of sweet oil: give barley water and gruel, avoiding solid food for 24 hours. Avoid emetics.

Muriatic and oxalic acids, same treatment.

Sulphuric acid (vitriol).—Give carbonate of magnesia in water or milk. Lime water or simple magnesia unless in small quantities are not advisable. Same treatment afterwards as for nitric acid.

Corrosive Sublimate.—Give at once raw eggs, yolk and white mixed. Flour and water if eggs are not to be had. Avoid emetics.

Caustic (nitrate of silver).—Give common salt and water in large quantities until vomiting is produced. Barley water, gruel and oatmeal porridge.

Opium, Morphia, Indian Hemp, Prussic Acid, and all other narcotic poisons, give emetics at once. Use every endeavour to keep the patient from going to sleep. Give strong coffee; keep him walking about, dash cold water in face, pour buckets of water over his head, apply ammonia (smelling salts), or burnt feathers to nostrils. In poisoning from prussic acid, cold water poured over the head is especially called for.

Arsenic.—Give the strongest emetics at once.

Strychnine.—Emetics as for arsenic.

In all cases of poisoning the first thought should be 'what was the agent used?' A careful observation will generally enable the most inexperienced to recognise the effects of narcotic poisons, by the patient being in a deep sleep, breathing heavily, and probably snoring, with skin cold and pulse weak: the smell of the breath will generally indicate if he is suffering from the effects of spirituous liquors, in which case give emetics and pour water over the head, for fatal results frequently ensue, if nothing is done to rouse men from the comatose state arising from excessive drinking.

Poisonous Snake bites should be at once cut out with a knife, sucked, bathed in warm water to encourage bleeding, burnt with caustic, and have liquor ammonia applied freely. One or all of these external means may be resorted to. The strength should be supported and stimulants given freely. Liquor ammonia may be given in doses of 5 drops every quarter of an hour for 1 or 1½ hours if the patient does not rally. If this is not at hand, apply strong rum or brandy, and make him drunk by giving the same internally.

Bites from Scorpions, Centipedes, Wasps, &c., should be treated externally with liquor ammonia: if there is depression of spirits, give it in doses of 5 drops at a time, or if none is at hand, use strong spirits internally and externally.

To restore a half-drowned man.—Do not remove him into a house, but try your remedies 'on the spot, in the open air, exposing the chest and face to the breeze.' 'Place him gently on his face with his wrist under the forehead;' this will clear the throat: observe him keenly for some seconds, to see if he breathes, if not, turn him well and instantly on his side; 'excite the nostrils with snuff, the throat with a feather, &c., dash cold water on

the face previously rubbed warm:' if this is unsuccessful, replace him 'on his face, raising and supporting the chest well on a folded coat: turn him very gently on the side, and a little beyond, and then briskly on the face alternately, repeating these measures deliberately and perseveringly 15 times in a minute, occasionally varying the side.' Each time that he is on his face 'make equable but sufficient pressure, with brisk movement along the back of the chest; removing it immediately before rotation on the side.' If not too late, the result will be respiration. Whilst this is being done, others should have removed his boots, putting his feet against their own stomachs next the skin: if warm bricks or warm water are to be had, his extremities may be warmed by them; hot bricks, or stones, or pieces of any metal may be advantageously placed over his groins, and under his arm-pits. 'His limbs to be rubbed upwards, with firm grasping pressure, and with energy, using handkerchiefs,' &c. This induces circulation; as he revives, dry and warm his limbs, and when dry, clothe him plentifully.

Officers before starting on detached duties where they will be for days or weeks without medical assistance, should carry a small store of simple medical remedies, the quantity of which must depend upon the number going with them, and the probable length of their absence. The prevailing diseases will influence the nature of the remedies to be taken. A doctor on the spot should be consulted on this point. The following should always be taken: a linen bandage, to be served out to each man, the sergeant to have a tourniquet. The officer to carry a small supply of sticking-plaister, lint, and a little oil silk, a pair of scissors, a pair of forceps to pull out thorns, a couple of needles and some silk to sew up sword cuts, a small sharp knife, a small piece of nitrate of silver in holder. A supply of quinine in powder, pills for diarrhœa, &c. When a field companion is to be had, it should invariably be taken instead of the above detail of medicine, as it contains an assorted collection.

The Weather.—The weather has the greatest influence upon military operations. It is needless to recount the many instances where the most accurately calculated operations have been brought to nought, and perhaps turned to disaster, by such little trifles as a shower of rain, &c. Staff officers of all ranks should endeavour to be 'weatherwise.' In other words, they should by a constant study of the heavenly phenomena, learn to know what sort of sky precedes a storm, rain, &c., &c.

From the moment you enter the country that is to be the theatre of war, the small aneroid barometer should be observed, and its height remarked three times a day—upon rising in the morning, at noon, and just before lying down to sleep at night. No attention whatever should be paid to the words 'fair,' 'rain,' &c., noted on the dial, for they are apt to mislead. An

aneroid falls sometimes from wind, and rises at the approach of severe frost. The local effect of high wind with and without rain, of rain alone, of frost, &c., upon it should be noted. The changes of the moon have great influence upon the weather.

A halo round the moon indicates approaching wet weather; the larger the circle, the nearer the rain. There is an old rhyme to the following effect, regarding the changes of the barometer: 'Long foretold, long last; short notice, soon past: First rise after low, foretells stronger blow.' The following table is of use :—

If the new moon, the first quarter, the full moon, or the last quarter happens:	IN SUMMER.	IN WINTER.
Between midnight and 2 in the morning	Fair	Hard frost, unless the wind be south or west.
—— 2 and 4 morning .	Cold, frequent showers . .	Snow and stormy.
—— 4 and 6 „ . .	Rain	Rain.
—— 6 and 8 „ . .	Wind and rain . .	Stormy.
—— 8 and 10 „ . .	Changeable . .	Cold rain, if wind be west; snow, if east.
—— 10 and 12 „ . .	Frequent showers .	Cold and high wind.
At 12 o'clock at noon & 2 P.M.	Very rainy . . .	Snow or rain.
Between 2 and 4 P.M. . . .	Changeable . . .	Fair and mild.
—— 4 and 6 P.M. . . .	Fair	Fair.
—— 6 and 8 „ . .	Fair, if wind north-west . . .	Fair and frosty, if wind north or north-east.
	Rainy, if south or S.W.	Rain or snow, if S. or S.W.
—— 8 and 10 „ . . .	Ditto . . .	Ditto.
—— 10 and midnight . . .	Fair	Fair and frosty.

Observations.—The nearer the time of the moon's change to noon or midnight, the more nearly will the result accord with the prediction.

It is also said that less dependence is to be placed on the table in winter than in summer.

The moon is new when the points are towards your left hand as you look at it; when they point in the opposite direction, it is a decreasing moon. The full moon is due E. at 6 P.M., due S. at midnight, and due W. at 6 A.M.: the first quarter is due S. at 6 P.M., and due W. at midnight; the last quarter is due E. at midnight, and is due S. at 6 A.M.

It has been stated as the result of long and careful observations, 'that the third day before the new moon regulates the weather on each quarter-day

of that lunation, and also characterises the general aspect of the whole period. Thus, if the new moon happened on the 26th of May, the term day was the 24th: the weather of that day was to be, that of the 26th and the 3rd, 11th, and 19th of June, the quarter days respectively. The almanack carried in the pocket-book should show the changes of the moon. The old farmers' predictions of fine or rough weather, deduced from observing the flight of birds, are really based upon truth, and can be explained scientifically. When swallows fly high, expect fine weather; when they fly low, the reverse.

Sea-gulls flying inland or collected there in large numbers are forerunners of bad stormy weather.

Admiral Fitzroy says, whether clear or cloudy, a rosy sky at sunset presages fine weather; a red sky in the morning, bad weather or much wind (perhaps rain); a grey sky in the morning, fine weather; a high dawn, wind; a low dawn, fair weather. Soft-looking or delicate clouds foretell fine weather, with moderate or light breezes; hard-edged oily-looking clouds, wind. A dark, gloomy blue sky is windy; but a light, bright blue sky indicates fine weather. Generally, the softer the clouds look, the less wind (but perhaps more rain) may be expected; and the harder, more 'greasy,' rolled, tufted or ragged, the stronger the coming wind will prove. Also a bright yellow sky at sunset presages wind; a pale yellow, wet; and thus, by the prevalence of red, yellow, or grey tints, the coming weather may be foretold very nearly; indeed, if aided by instruments, almost exactly. Small inky-looking clouds foretell rain; light scud clouds driving across heavy masses show wind and rain; but, if alone, may indicate wind only. High upper clouds crossing the sun, moon, or stars, in a direction different from that of the lower clouds, or the wind then felt below, foretell a change of wind. When sea birds fly out early and far to seaward, moderate wind and fair weather may be expected; when they hang about the land, or over it, sometimes flying inland, expect a strong wind with stormy weather. When birds of long flight—rooks, swallows, or others—hang about home, or fly up and down or low, rain or wind may be expected. When animals seek sheltered places, instead of spreading over their usual range; when pigs carry straw to their stiles; when smoke from chimneys does not ascend readily (or straight upwards during calm), an unfavourable change is probable. Dew is an indication of fine weather; so is fog. Neither occurs under an overcast sky, or when there is much wind.

PART III.

Outposts.—The most arduous, while at the same time the most important duties that devolve upon soldiers on service, are those of outposts. Commanding officers should lay great stress upon that importance in their conversations with those serving under them, and they should take every opportunity of instructing both officers and men in such duties. All concerned should feel that the safety of the army and the honour of the country depend upon their vigilance and activity. Field officers of the day should be most strict in enforcing the rules of the service as regards outposts. With an army their duty is to protect it from surprise; with detachments to do so also, and to enable them to retreat in time without being cut off. They are also used for the purpose of gaining and transmitting intelligence of the enemy's position and movements.

They should act as the feelers of an army, guarding it from every danger, and keeping it constantly informed of everything that can add to its safety, or assist its movements. They are also often employed as a screen to the movements of the main army in their rear, and to prevent any intelligence of those movements from coming to the knowledge of the enemy.

The army is protected from surprise by detachments, called in our army outlying piquets, posted in advance, on the flanks, and when necessary in the rear of it. Information of the enemy's position, &c., is obtained by means of patrols, varying in strength according to circumstances.

The hand with the fingers well opened describes the outpost system, the nails being the outlying piquets, the middle joints of the fingers the supports, the knuckles the reserve, and the wrist the troops or camp to be protected from surprise.

Like advanced guards, all outposts should be as far in advance of the force they are thrown out from as they can be with safety; that is, without exposing them to be cut off or overpowered before assistance can reach them.

With us, unfortunately, outpost work is mostly regarded from a defensive point of view: our drill books lay down rules as to the manner in which it is to be conducted, as if the object was exclusively to guard against sur-

prise. If this duty was classed more as an active than as a passive one, that is, if it was ruled that the primary object to be attained was to obtain information of the enemy's doings, whereabouts, and intentions, the result would be twofold, for not only would the army be protected from surprise, but the G.O.C. would be supplied with most valuable information. The more constantly your patrols and scouts are in contact with the enemy, feeling his outposts, picking up stray prisoners, &c., &c., the more efficiently will you be protected against surprise, and screened from the inquisitiveness of your enemy. The farther you can push forward your advanced parties and their attendant scouts without compromising their safety, the greater will be their opportunities for fulfilling this object. Those parties should cling to the enemy, never losing 'touch' of him for a moment. You will lose some men in this work, but their loss will be amply compensated if you are kept daily informed of your enemy's movements. Whenever mounted infantry is introduced into our service, and its employment properly understood, these outpost duties will devolve to a very considerable extent upon it.

The distance at which cavalry outposts should act in front of the army which they protect, must depend upon the position and nearness of the enemy; but if possible, and especially in a friendly country, they should be many miles in advance of the main body; when in contact with the outposts of the enemy, they should watch, feel, and never quit them. Clever outpost officers will nearly always divine the movements of the enemy from the conduct of his advanced parties.

The outposts should form a continuous chain, and should considerably overlap on both flanks the line or lines of operation of the main army.

Officers employed upon outpost duty will take care before starting that their men have the proper quantity of ammunition, their rations for at least 24 hours (cooked if possible), and their water-bottles full; they themselves having their rations also with them.

All officers employed upon such duties should have a telescope, compass, watch, metallic pocket-book, and above all things a good map of the country. Indeed, all sergeants ought to be so provided. The name of every man composing the piquet should be entered in the officer's pocket-book.

In front of each army corps—which is, say, marching by two or more roads—there would always be an advanced guard of about 4000 or 5000 men (its composition depending upon the nature of the country) which would always be in advance of the main body either a short day's march, or some 4 or 5 miles at least, according to the proximity of the enemy. The security of the army from surprise will chiefly depend upon the manner in which these advanced guards do their duty in covering the front well with a chain of outposts, in patrolling in all directions, and in reconnoitring and watching the enemy's movements.

The outposts required on the flanks and rear of an army should be furnished by the troops detached in those directions to guard it from surprise during its movements.

It is advisable that piquet duty should be done by whole battalions of infantry or regiments of cavalry; all their baggage, except their entrenching tools and a proportion of their reserve ammunition, remaining in rear with the main body. These units to be divided into two equal portions, one to be the reserve, the other to furnish the outlying piquets and their supports.

When infantry are used, there should be with every piquet one or two dragoons to be used for carrying information to the rear.

If there is no superior officer in charge of the outposts, the officer commanding a corps sent out to cover a certain portion of the country will, in the absence of specific orders, decide on the positions the piquets are to occupy, covering his front while doing so by a line of skirmishers; and in the case of cavalry, by a number of patrols sent on in advance to reconnoitre the neighbouring villages and discover the enemy's whereabouts. If after a battle, the outpost arrangements should be made generally close in rear of the troops who are in actual contact with the enemy, who will retire slowly through the line of sentries, when the piquets have been established. The officers commanding corps on outpost duty should communicate personally with the corps on their flanks, learning the positions occupied by their reserves, &c., communicating with them from time to time, should any important information regarding the enemy's movements be obtained.

A battalion of infantry whilst so employed will therefore be distributed as follows. In reserve, 4 companies, and on outlying piquet, 4 companies; each of these latter 4 companies to be divided into two equal portions, one to act as support, the other divided into two or more piquets of about equal strength (of about from 30 to 40 men each); they again being divided into three equal parts, one furnishing the N.C.O. for the reliefs, patrols, &c., and the privates for patrolling; the other two furnishing 3 reliefs for the double sentries in advance, and for the single one over the arms.

A battalion would, therefore, cover from 2000 to 3000 yards, according as the country was close or open. As cavalry can watch a far greater extent than infantry, and by their power of patrolling to long distances in advance, can more easily obtain information of the enemy's doings, a regiment of cavalry would cover about the same extent of front, it being remembered that cavalry are used in a more open country than that where infantry outposts are employed.

The distances these several parts into which a battalion is to be divided should be from one another must greatly depend upon the nature of the country and the arm of the service furnishing the outposts; but the

arrangement must be of such a nature, that under no circumstances whatever, nor by any possibility, shall it be feasible for an enemy to reach the main body until it has had ample time to turn out.

In some cases it may be advisable to have a couple of H.A. guns (their waggons being with the main body) with the reserve. The officers commanding the reserve will send out strong reconnoitring parties towards evening, and especially towards daybreak, to obtain information of the enemy's whereabouts. Any important news so obtained to be communicated at once to the general, the authority for its correctness being stated.

On ordinary ground when infantry is used the reserve may be about 800 yards in advance of the main body, the supports about 400 yards in advance of them, the piquets about 300 or 400 beyond them, with double sentries thrown forward about the same distance: when cavalry is used these distances may be doubled, and in some instances trebled with safety.

In rear of all these will be the main body of the force detached to the front of the army to protect it, which whilst on the move will form its advanced guard. The outpost duties should be carried on by a larger force, with increased vigilance, and at a greater distance from the main body, when an army is merely halted for the night in some chance position of no strength, than when it occupies one carefully selected for defence.

An Officer commanding a Company or Troop will march upon the positions to be occupied by the supports with all the precautions of an advanced guard, examining the country he passes over, and selecting positions for disputing the ground, in case of being driven back by the enemy. Having decided upon the position for the support, he will then move forward his two piquets, sending an officer with each; he will in the first instance go forward himself with one of them and post it, indicating roughly where the other is to advance to, and subsequently correcting the position taken up by it, should he consider it necessary to do so.

No shouting or other noise should be permitted at outposts, nor should the men be allowed to straggle, or show themselves to the enemy. The strictest discipline to be maintained, and the inhabitants treated with every civility and consideration.

Outposts should always keep defiles, bridges, and causeways between them and the enemy. It may be necessary, however, sometimes to have vedettes or sentries beyond them.

If a piquet occupies a wood, the sentries should be posted along its edges, whilst the piquet itself should be 100 or 200 yards behind them. If the orders are for piquets to hold their ground as long as possible in case of attack, they should in such positions advance, and make their stand along the line of sentries.

When a river is to be watched by a line of piquets, the important places

to guard are bridges, fords, and where it forms re-entering angles towards the enemy, as crossings will seldom be attempted where it forms a salient angle towards him: localities where there are wooded islands dividing the river into several channels should also be carefully watched.

As soon as an officer commanding an outpost, or advanced piquet (whether of cavalry or infantry), arrives on his ground, he is to endeavour to make himself master of his situation, by carefully examining not only the space he actually occupies, but the heights within musket shot, the roads and paths leading to or near the post, ascertaining their breadth and practicability for cavalry and cannon; to insure a ready and constant communication with the adjoining posts and vedettes, in the day by signals, in the night by patrols. He is to examine the hollow ways that cover the approach of an enemy, and consider all the points from which he is most likely to be attacked. He will by these means be enabled to take measures to prevent surprise; and should he be attacked during the night, from the previous knowledge he has obtained of the ground he will at once form a just estimate of the nature of the attack, and make his arrangements for defence with promptitude and decision.

Sentries and Vedettes.—In selecting the line for the chain of sentries, care must be taken not to extend it too much,—to post the men in the most advantageous situations for observing the roads and country in front, and to keep them as much concealed from the view of the enemy as the nature of their duty will admit. It is very desirable that every elevated spot which overlooks the communications in the rear shall be taken within the chain of sentries; but if this cannot be effected without extending the sentries too far, a party must be sent to occupy the height during the day, and care must be taken to support and insure the retreat of this party if attacked. Sentries must be so placed, moreover, as to secure one another from being cut off, and at such distances as to prevent any enemy from passing unperceived between them during the night. Sentries should never be posted near any copse or cover from which a sudden rush might be made upon them; but all woods, ravines, &c., in the neighbourhood of the post must be watched, and occasionally visited by patrols, to prevent the enemy from assembling a body of troops unobserved in the vicinity. The fewest possible number of sentries should be employed; with which object impracticable ground, such as ponds, marshes, and precipices, should be embraced in the line of sentries, so as to shorten the extent of front to be guarded.

Sentries and vedettes should always be double. The officers and N.C.O.s with the piquets, should visit them frequently during the day, and between every relief during the night and foggy weather. This is all the more essential towards morning. If there is a house or church near the piquet, an intelligent man with a telescope should be posted on the top during daylight.

At night, sentries should be on low ground, keeping the high land between them and the enemy, so that any one passing over it should stand out against the sky, and so be easily seen.

In most countries but few sentries are required by day. Bayonets should never be fixed by sentries during the day, or on bright moonlight nights: in thick weather, and on moonless nights they should always be fixed. By day they should have in view those on both sides of them, and at night they must take it in turns to patrol to their right until they meet the next sentry there. However, in clear nights, the less motion there is the better. Smoking should be strictly forbidden to sentries, and they should not converse above a whisper. Sentries by night should be relieved every hour. It is most desirable to have piquets divided into four reliefs for nightwork, but there should never be less than three.

At night, when the officer or N.C. officer visits the sentries, he should patrol with one of them from 30 to 40 yards to the front, according to the nature of the ground. Sentries are frequently posted in positions which are of such difficult access, or at such a distance from the piquet, that it is advisable to detail a party with a N.C. officer of just sufficient strength to furnish the sentries. The line of sentries should be to the enemy an impenetrable veil, behind which one can move, where it is required, without the enemy being able to discover the movement, whilst at the same time they should be the eyes of the army, always peering forward to watch and report what the enemy is doing. Every road and byway should be carefully watched by them.

Both by day and by night sentries should only allow one person at a time to approach their post until they are satisfied that they are friends. If strangers by night, they must be forced to halt until the next relief comes round, when they should be taken before the officer commanding the nearest party in the rear, who will, if necessary, send them to the field officer. If by day, a signal to be made to the sentry at the piquet (or the connecting one, if the former should be far away). An officer from the piquet should at once proceed to the spot. No matter who the intruders may be—deserters, spies, or an officer with a flag of truce, the least possible conversation is to be held with them. It is a good plan to allow the line of sentries to be passed at only one point along the front occupied by the piquets of each regiment or brigade, such point to be where it is crossed by a main road. A sergeant's party should be posted there, to examine all who attempt to pass, and to see that no one does so unless duly authorized.

If it is a flag of truce, an officer remains with the bearers until an answer is received from headquarters. He should not allow them to proceed more than a few yards inside the line of sentries; nor must he allow them to talk to others. He must be careful that advantage is not taken of the situation for the examination of our position. He will therefore detain them in such a place that they can only see well in the direction of their own camp. The usual custom is to conduct an officer, bearing a flag of truce, to some house or tent in or near camp, blindfolded. English officers

are apt to neglect such precautions, but they are wrong to do so. If the conference is to be held at the advanced sentry's post, an officer will be sent from headquarters to preside at it. It may perhaps only be a letter, in which case, unless an answer is immediately required to it, the officer commanding the piquet will give a receipt for it, when the bearer will return to his own lines without loss of time. If the bearer is to be conducted to any point within the line of piquets, he should be well blindfolded, and conducted there by a circuitous route, not passing immediately by any of the piquets if they can be avoided.

In the case of deserters, spies, or others coming from the enemy's lines, the officers commanding piquets should be careful that no questions be put to them by their men. If questioned by many, they weary of answering, and become unwilling to give information subsequently, when examined at headquarters by those whose duty it is to do so.

They should at once be sent to the F.O. of the day, who will dispose of them according to the orders on the subject existing in the army at the time. Sentries should be instructed that they must at once give the alarm by firing at any body of the enemy approaching their posts, or the line of sentries from any point that may come under their view. They must continue to fire quickly as long as the enemy advances, and until they are driven in. They should retire as slowly as possible, one man being always loaded, as in skirmishing, and only falling back step by step, so as to avoid being taken prisoners. In the event of an accident happening, to prevent their rifles going off, they must shout as loud as they can, and if by day wave their caps to attract attention. Should a man desert from the piquet or be taken prisoner, it must be at once reported to the F.O., and to the piquets on your right and left.

Officers should carefully select their men for sentry duty, putting the best men on the most exposed and important posts. In every company there are many near-sighted men, who cannot safely be used as advanced sentries. They should be used for patrol duties, sentries over the arms, fatigue duties, &c.

Flanks to be protected.—The flanks of a line of piquet sentries should be thrown a little back, and if not protected by the nature of the country, a detached party under the command of an officer should be posted in the most favourable position to prevent the flank from being turned.

Connecting Sentries.—Communication should be kept up by means of single sentries between the front line of sentries and the piquets, also between the piquets, the supports, and the reserve.

The same men should always be mounted on the same posts, when it comes to their turn to go more than once on sentry.

No man to go beyond 20 yards from his piquet without leave.

Single sentries must always be posted over the arms of the piquets, supports, and reserves, the arms being placed so that the sun shall not shine on them.

For these and the connecting sentries it is most useful to have a rail or a long rod, supported at each end by a forked stick, pointing in the direction of the sentry in advance, upon whom their attention is most particularly to be directed.

Officers, particularly those on the staff, should study the general habits and customs of the enemy with reference to their outposts, their hours of *réveillé*, their practice in relieving outposts, sentries, &c.

By day, the glittering of the sun upon the arms of troops in motion indicates the direction of the march. If the rays are perpendicular, they are moving directly towards you: if slanting from left to right, downwards, they are moving towards your right, and *vice versâ*. If the rays are intermittent and varied, they are moving away from you.

When facing the sun, objects seem nearer than when the back is to it. The neighing of horses, barking of dogs, rumbling of carriages, or clouds of dust, are indications of movements that must not be neglected.

Officers commanding piquets in close proximity to those of the enemy must be careful to avoid coming into useless collision with them. Sentries firing at one another, and attempts to carry off detached posts, sentries, &c., unless with some special object in view, are to be avoided, as they lead to nothing, give rise to reprisals, and tend to the general annoyance of all supports, reserves, and even the main body. At the same time, all attempts on the part of the enemy's piquets or patrols to approach our sentries must be stopped. It is wonderful how soon light troops opposed to one another learn mutual respect and forbearance, and come to a sort of tacit understanding upon such matters.

An Officer to strengthen his Post.—An officer ought to strengthen his post, when practicable, by constructing abattis, breastworks, &c.: where the defence of a bridge or ford is intrusted to him, he ought never to omit throwing up something of the kind to protect his men, and impede the advance of the enemy. An officer ought not, however, without permission, to block up a main road with other materials than such as are easily removed. A tree felled with judgment, brushwood cut to a certain distance, pointed stakes about breast high, placed on the point most assailable by the enemy, may be attended with the greatest advantages, and can be effected with the common hatchets or billhooks with which the soldiers are provided for the purpose of cutting firewood.

He should ask himself what he would do if attacked from different directions. His plan should be prepared as soon as he has examined his position. Though by nature he be slow of thought, he has nothing to fear, provided he has made up his mind beforehand as to what he will do when attacked.

Nothing checks the ardour of troops more than an unexpected obstacle within a moderate distance of the place attacked; this must not be overlooked by an officer who defends, and no impediment he can throw in the enemy's way, at that distance from his post, must be deemed unworthy his attention.

He should open up good communications to the rear, by which to retire in case of need. He must remember that, in case of attack, the longer he disputes every inch of ground, and the more he forces the enemy to deploy in order to drive him in, the more efficiently is he performing his duty.

An Outpost must not shut itself up without Orders.—An outpost ought not to shut itself up in a house, or an inclosure, with the intention of defending itself to the last extremity, unless particularly ordered to do so, or that circumstances may render it necessary at the moment, for the preservation of the party, in the expectation of support.

Under what circumstances a Piquet should retire.—A piquet may with safety defend its front as long as its flanks are not attacked; but as soon as the enemy attempts to surround the post, the piquet may begin to retire.

If the piquet on either flank is forced back, you must throw back your line of sentries in that direction, and watch for an opportunity of falling on the enemy's flank as he advances.

Precautions to be taken when fires are allowed.—No fires should ever be lit by piquets; when a support is permitted to have a fire, it should always be as much as possible concealed from observation; and the alarm post, in the event of an attack at night, should invariably be fixed at a short distance in the rear of the fire, so as to prevent the support from being seen, when drawn up, and to compel the enemy to expose himself while passing the fire, should he advance. All cooking for the piquets must be done with the supports or reserves.

The officers should take it by turns to sleep for an hour or two; but one must always be on the alert.

In bad weather it is advisable that piquets should have *tentes d'abri*, care being taken that they are placed in positions where they cannot be seen from the front.

Outposts to be under Arms an Hour before Daylight.—Outposts will get under arms in the morning an hour before daylight; and if everything appears quiet in front, the officer will, as soon as he can discern objects distinctly, proceed to occupy the same post that he held the day before; but he must previously send forward patrols to feel his way, and should any change be remarked in the enemy's posts or position, he will report it immediately to the field officer of the day.

When advanced Piquets should be relieved.—As attacks are most commonly made about daybreak, a desirable accession of force will be always obtained by relieving the piquets at that hour.

Arrival of the Relief.—When the new piquet has arrived, the officer commanding it will accompany the officer of the old piquet along the chain of posts, and this officer will point out the situation and strength of all the enemy's posts, and afford every other information in his power to the relieving officer.

Duty of the Officer of the old Piquet.—When the sentries are relieved, and the weather is sufficiently clear to ascertain that there is no indication of an attack, the officer who has been relieved will forward a written report to the field officer of the day, fall back upon the reserve piquet, and march to camp in the same order as when he advanced; but if the advanced piquets should be attacked before he arrives in camp, he will consider it his duty to face about instantly, and march to their support.

When Piquets are attacked.—When piquets are attacked, the same rule will be observed as in all other skirmishing, and the detached officers' parties will not run in on the main body, but support the skirmishers; and when compelled to retire, they will, if possible, retreat on the flank of the main body, and thereby afford mutual support to each other. If forced back at night, they should keep up a heavy fire so as to alarm those in rear.

The principal Object of Piquets in case of Attack.—In the event of an attack, the commander of a piquet must ever bear in mind that the great object of his efforts is to gain sufficient time to enable the main body in his rear to get under arms and prepare for action. The points he is to dispute in falling back having been previously selected, few cases can occur in which it will be impossible to attain that end, without endangering the safety of his piquet; but even in an extreme case, he must remember that it is his duty to sacrifice himself, rather than be driven in upon the main body before it has had time to form.

Outposts pay no Compliments.—Outposts pay no compliments, but when approached by a general officer, the field officer of the day, or by any armed party, they will fall in and stand to their arms.

Sentries and vedettes on outpost duty pay no compliments.

PATROLLING.—One of the most necessary and effectual methods of preventing surprise and of gaining information remains to be noticed, viz., patrolling, without which, however active and alert the sentries, the service of the outpost never can be properly done. The mode of conducting these patrols, their strength, and the distance to which they may be sent, are all necessarily dependent on the ever varying local circumstances in which piquets may be placed; but it may be laid down as a good general rule, that, when near the enemy, a patrol should be sent out once between every relief during the night.

Vigilance, Silence, and Circumspection indispensable in Patrolling.—Vigilance, silence, and circumspection, must be strictly enjoined upon all patrols: no noise must on any account be made, and when anything is to be communicated, it should be done in a whisper.

It is not possible to lay down exact rules for conducting patrols in every case that may occur on service, but one or two of the most usual modes of carrying on this important duty may be briefly adverted to.

Patrolling in Front of the Line of Sentries.—The patrol, on leaving the piquet, should when practicable communicate in the first instance with the next post upon the right (or left), and patrol cautiously along the whole front of the line of sentries, just near enough to see them, and communicating with the next post upon the left (or right), return again to the piquet by the rear of the chain. The sentries must not be thrown off their guard by the frequent appearance of these patrols, but be taught to expect an enemy in all who approach them: some preconcerted signal, or interchange of countersign in a low tone, should be used, and which should be changed at every relief.

Patrolling when the Enemy's Posts are Distant.—Patrols must also be sent along the roads in the direction of the enemy's posts, to such distance as may be deemed expedient. These patrols must be preceded by feelers, quick intelligent men selected for that duty, whom no sound will escape, and whose experienced ears will detect the approach of danger long before it reaches them. A patrol must, above all things, avoid unnecessary firing, or, in other words, false alarms: on hearing the approach of footsteps the feelers should instantly fall back to the patrol; and should the sounds indicate the advance of a larger body than a patrol, one or two men should be sent back with all haste to inform the officer of the piquet, who will make immediate preparations for defence. The patrol will retire steadily and unobserved, if possible, upon the piquet; but if perceived and overtaken by the enemy, an incessant fire must be maintained, in order to apprise the camp that the enemy is coming on in force. Although it may safely be inferred, that if the piquets know their duty, and are judiciously drawn up for the defence of the roads, it will be extremely difficult for an enemy, however strong, having failed in his plan for taking the advanced posts by surprise, to make head, under all the disadvantages of a night attack, against men who know the ground, and whose plans have been previously concerted for disputing those points in their line of retreat, and where the disparity of numbers must, in the dark, be in a great measure neutralised.

Patrol to avoid exchanging Shots with the Enemy.—In falling in with an enemy's patrol in advance of the chain of sentries, it will always be most prudent to retire at once without exchanging shots, which can only tend to harass and disturb the troops in their rear.

A strong Patrol to be sent out just before Daylight.—A strong patrol will always be sent some distance on towards the enemy's posts just before daylight, and this patrol, above all others, must proceed with redoubled caution, for fear of falling in with the enemy's columns, waiting for daylight to attack. Their object is to keep the enemy's reconnoitring patrols at a distance, or to dislodge or capture some of his advanced parties, and to learn what is going on behind them. These patrols should be furnished from the reserves or main body. (See Articles on "SCOUTING" and "RECONNAISSANCES.")

Defence of Posts.—The object to be attained by an officer directed to defend any village, house, garden, &c., is first to render it in a rough manner as like in outline as possible to a regular fortification, the guiding principles of which, it is taken for granted, all know. It is assumed that the garrison is sufficient for the extent to be defended; in other words, about one file to every running yard of hedge, wall, &c., that represents

the parapet of the *enceinte*. If the post is of any extent, there should be about one-fourth more as a reserve.

When guns are used in the defence of redoubts or fortified villages, they should be kept out of sight until the moment arrives for them to pitch into the enemy's assaulting columns. They should not engage artillery except under very peculiar circumstances, and when so used, they should be withdrawn as soon as the enemy's artillery begins to overpower them. For these reasons they should be served *en barbette* instead of through embrasures, about 20 or 30 filled sandbags being kept with each gun, to form a rough temporary protection for the gunners from the enemy's marksmen.

An officer desired to occupy and defend any such place should examine it before occupying it with his men, and will determine upon the exterior line that he will defend. He will then distribute his men along it as they are to stand, giving each company or section a certain space to prepare for defence. The place should be searched for tools if there is any scarcity of them.

The first thing to be done by the officer commanding each company or section is to obtain cover for his men which will enable them to deliver their fire with effect; secondly, to strengthen his portion of the work, so as to prevent an enemy from entering it; thirdly, to render the approach to it as difficult as possible, and to clear away all cover from his immediate front. The reserve in the meantime to open out communications, and strengthen any church or other central building which has been selected as a citadel. To it, or some other building near it, all the wounded are to be carried during the action. Household furniture is of great value in forming breast-works. Boxes, barrels, and bags filled with earth make good parapets, and assist greatly in making loopholes. The glass in all windows of houses to be defended, to be broken. If the roof is of thatch, it should be removed. The garrison must prepare for a heavy artillery fire being brought to bear upon it. As all armies are now provided with rifled field-guns, it is impossible in hasty intrenchments to obtain complete protection from their fire, and the plan of banking up walls with earth, unless there is time to construct very thick parapets, is labour thrown away. When time permits, effective cover from artillery can, however, be obtained by digging trenches behind the palings and hedges it is intended to hold. The reserve should be as much as possible screened from fire, so that it may be ready to charge the enemy in any direction where he may have forced an entrance. Everything will depend upon the officers. If they remain cool and jolly, their men will follow suit. The slightest sign of any one being ready to look over his shoulder to the rear is fatal. An officer in command who abandons the defence of a post until at least two-thirds of his garrison are *hors de combat*, should be shot. Let every one remember Hougoumont.

Reconnaissances.—The most reliable method of obtaining information as to the enemy's movements is by reconnaissances, which may be divided into four classes.

1st. Reconnaissances in force.

2nd. Those made by a detachment of all arms, of sufficient strength to protect themselves and secure their retreat.

3rd. Those made by staff officers, accompanied by small cavalry detachments.

4th. Those made continually by individual officers from the outposts.

The first is an affair for the C.-in-C., and must never be undertaken except by his special orders. It has frequently been adopted by generals previous to an action, for the purpose of ascertaining the enemy's strength and dispositions. It should not be attempted until late in the day, when approaching night will inevitably put a stop to all fighting. It should be conducted in a manner similar to beginning an action. When driving in the enemy's piquets, it is advisable to make as many prisoners as possible from different parts of the lines. This must be accomplished by a sudden dash of cavalry to cut off sentries, vedettes, &c. Having driven in the enemy's outposts, approach his lines at all points by swarms of skirmishers; bring your batteries into play from all commanding points, taking care that the waggons are left well in the rear, and that only just sufficient men and horses to work the guns are made use of. By this display of your artillery you will most probably force him to show where his guns are placed. During these operations every available staff officer must be in front among the skirmishers, taking advantage of all high ground or trees to observe the enemy's position. They should make sketches, both of the features of the ground and of its general outline, as if they were taking landscape pictures, noting carefully all prominent objects which catch the eye, such as a large tree, a peculiar rock, farm-house, &c.

It is advisable that, previous to starting, each should make in his pocket-book an enlarged plan of the enemy's position, upon a scale of 4 or 6 in. to the mile. Although doing so from a plan upon the small scale of three or four miles to the inch will not give you any idea of the ground, beyond the fact of there being hills at certain places, and the position of the roads and villages, yet if 20 or 30 staff officers, dispersed among the skirmishers along the front of a position, are provided with skeleton sketches of this nature, they can easily fill in enough of what they see in front of them (using their telescopes and prismatic compasses) to make a most invaluable plan when all have been collated. The position of several points in rear, that may be visible for miles in all directions round, should be accurately fixed, so that the reconnoitring officers can fix their own positions at all times by them. Each prisoner taken should be asked the following questions:—What corps, division, regiment, and battalion he belongs to; the names of the officers

commanding the above; where his battalion is encamped; what battalions and regiments are on the right and left; what number of divisions or *corps d'armée* are there present; whether they are under canvas or bivouacking; how long his battalion has been there. If it has been there some days, have any, and what, troops marched into position since then. Where did his battalion march from; with how many other battalions, or with what divisions did it march; frequently a soldier will not know the name of the village or place marched from that morning, but he will always know the hour at which he started, and this will enable you to ascertain the number of miles he had marched before he was taken, and so help you to guess where he had come from. What was the length of the marches, the general hour of starting in the morning, and the hour of halting for the night; did many fall out sick during the march, and are there many sick now in camp; have any large hospitals been established near the positions; what are the daily rations; are they good and efficient; is there plenty of forage; what are the camp rumours; what was in orders lately; have any intrenchments been constructed, and where are they; are they open or closed in the rear; what is the depth of their ditches; where are the cavalry; are the horses in good condition; is the general in command popular; have they a high opinion of him; who is considered the ablest man in the army; where are the batteries of his division, and how many are there; are there many heavy guns; is there a siege train or a bridge equipment, and where is each situated; where is army headquarters.

In questioning soldiers it is advisable to begin by talking to them about their colonel, whose name you should know from your pocket-book: the more knowledge you can show a man you possess about him and his surroundings the more information you are likely to obtain from him, and as he sees you already know so much, he will be chary of telling you untruths.

If a few prisoners are taken all along the front of an enemy's position, and they are carefully questioned as to the positions of their own battalions, a staff officer can easily mark on his plan where each division is placed, by referring to the organisation and distribution of the enemy's army into brigades, corps, &c.

Reconnaissances of this nature are sometimes carried out by a single division, forming the advanced guard of an army marching to attack an enemy in position, of whom it is necessary to obtain the most accurate information previous to the arrival of the main body. This is a more delicate operation than that already described, and must be carried out with the utmost caution. The enemy's outposts must be driven in, and his position approached by a line of skirmishers, who will try to push back his, and force him to display his strength. Such operation should not be attempted till within a couple of hours of night, and great care should be taken to watch the flanks well by patrols, to prevent the enemy passing in

force between the attacking division and the main body. The reconnaissances of fortresses that it is intended to besiege are made in this manner by the investing force.

THE SECOND CLASS OF RECONNAISSANCES is generally made by a detachment of all arms; its object is to obtain information by approaching the enemy's position, taking a few stray prisoners, engaging, perhaps, in a very partial skirmish, and then retiring. The extent to which it should engage must depend upon its strength, and its strength upon the distance to which it has been sent away from support.

It is a dangerous operation at all times and under all circumstances, for if the enemy discovers your weakness, he will annihilate you; it is a good plan, when it can be done, to precede such operations by rumours that you mean to make a general attack: he will consequently be more likely to show you his strength, and more chary in pouncing down upon you.

If the detachment is composed, say, of one battalion, 6 squadrons, and 4 H.A. guns, it would be well in some instances to leave the battalion and 2 of the guns in some strong position about 1 or 2 miles short of the enemy's outposts, whilst the rest advanced as a line of skirmishers with supports and a small reserve. If the infantry is not left thus behind, it should form the reserve, keeping about 1000 yards in rear of the supports. If such a force, by marching upon by-roads, succeeds in keeping its movements unknown to the enemy, so as suddenly to appear some two hours before dark in front of his outposts, a great deal may be learnt without any great risk; the cavalry can always, in case of need, fall back rapidly behind the battalion of infantry, and thus being well beyond the influence of the enemy's infantry, with night coming on, it has but little to fear. The officer in command of such detachments should be a staff officer of rank and ability; he will have to display all that he knows of war and its science to conduct it with credit to himself and advantage to the service. It is so difficult to do enough without doing too much; unless the enemy's outposts are driven in, nothing can be learnt, and the act of driving them in may lead to a fight, which, once commenced, it is difficult to withdraw from.

3rd CLASS.—There are no occasions in life when officers have such opportunities for displaying coolness and intrepid bravery, joined to extreme caution, as when sent out with a troop of cavalry to reconnoitre. This is a duty that cavalry officers, above all, should strive to make themselves perfect in; it is much to be regretted that so few of them in our army can survey, or even put on paper the roughest sketch of the roads and ground they pass over. The consequence is, that staff officers have generally to take charge of the reconnoitring parties. Their object is to examine certain districts of country, and report upon its roads, rivers,

general features, and resources; sometimes to find out the enemy's whereabouts, when they come under the head of patrols. It is taken for granted that the officer sent on such duty knows as much of the country as it is possible to do from maps and plans; that its principal roads, mountains, forests, villages, rivers, and the bridges over them, are familiar to him by name. In carrying out his reconnaissance, he will take all the same precautions as indicated for a patrol; when within reach of the enemy's patrols, he will march as much as possible along by-roads, and under no circumstances must he ever take up his quarters for the night in a village. If the weather is bad, he may avail himself of large open barns to shelter his men in. He should be most careful to spare his men and horses all unnecessary fatigue. Whilst far from the enemy, he may unsaddle all horses except those of his guard. As he may have at any time to depend upon the endurance and speed of his horses, he should watch their condition, wants, &c., carefully. If, before starting, the exact positions of all neighbouring villages, churches, hills, and prominent features have been determined, he can have but little difficulty in fixing his position from all the commanding points on his line of route, as described in Article on "SURVEYING." The art of conducting such a reconnaissance is intimately connected in all its details with surveying, so that the article on that subject should be carefully studied. Reconnoitring parties of this nature will be sent on all the roads that can be made available for the advance of the army; they should consist entirely of mounted men, from 10 to 50 in number, depending upon how many days the party is to be absent, the nature of the country, and the proximity of the enemy. The best possible guides should be obtained before starting (for whom horses must be provided); they should be well treated, and paid liberally by the officer in command, who for this purpose must be prepared with money (to be subsequently recovered upon travelling bills). (See Article on "SCOUTING.") If the officer in command does not speak the language of the country, he should be accompanied by an interpreter, and if he is not, it is a good thing to have the following questions, in the language of the country, printed on a sheet of paper, which, upon entering a village, he can present to the postmaster or chief man: the writer adopted this plan in China, during the war of 1860, and found it answer most satisfactorily.

'Please oblige me by writing answers opposite the following questions: 1. The name of this village. 2. The names of the three principal inhabitants. 3. The number of inhabitants. 4. Its distance from the several nearest villages and large towns. 5. The nearest market town, and when markets are held there. 6. The number of horses, mules, and vehicles in this village. 7. The number of cattle, sheep, goats. 8. Have any patrols been here lately, and if so, the dates? 9. What was the strength of such patrols in infantry, cavalry, artillery? 10. What is the nearest place where

there are any of the enemy, and how far is it off? 11. The names of the leading men in the next village to the front.

Other questions can be added according to circumstances. The Q.M.G. of the army should have large quantities of these papers of questions struck off, and distributed to officers going out with reconnaissances, who will get them filled up in the various towns and villages, being signed in all cases by those who write them. The opportunities afforded of visiting distant localities by these parties should be made available for distributing proclamations amongst the inhabitants, promising them protection for themselves and their property, and inviting them to bring in supplies, which will be paid for.

To obtain information from the inhabitants of a hostile country is an art in itself; except under the most extraordinary circumstances, force should not be resorted to, and the infliction of anything approaching to torture or corporal punishment must be avoided. In questioning villagers, it is advisable to use the local information you have obtained from others previously examined; if you know the names of the curé, the mayor, &c. &c., and any peculiarities for which they are locally famous, by adroitly referring to them in your conversation, your statements will most probably lead to others from those you are interrogating, and will certainly place you on better terms with them. It may often, however, be useful to carry off leading men from villages when they refuse to give ordinary information. Guides taken from villages or hamlets frequently tell you they don't know the way to the nearest localities, which, of course, is untrue. During the Indian mutiny the writer adopted the plan of always making such men accompany him on the march for the next stage, telling them that if they did not know the road he would point it out to them; they generally managed to recollect all about the country after the first hour's march, and were very glad to accept their day's wages when the march was ended. It is a good thing now and then to make a raid upon a village whilst a fair is being held; you can then secure men belonging to the place you want information about, or to which you require guides. You can detain them nominally as hostages, so that it be not suspected you mean to move in that direction. Never allow guides to be spoken to by the soldiers, as the rough ways of privates are apt to frighten the timid into stupidity, and to make the obstinate still more obstinate and silent. Keep the guide alongside of your own horse; try to engage him in conversation about his own affairs, the number of his children, his means of livelihood, and so lead him on to talk of the war and the way it is regarded by the people, the general rumours abroad concerning it, and the contending sides, his knowledge of where the enemy are, their position and condition, prevailing sicknesses, &c. This information should not be written down at the moment, lest the guide should see that he is being pumped, but opportuni-

ties should be taken to do so as soon as possible afterwards, which can always be found by halting oneself for a few minutes, ostensibly to make a partial sketch, or make a note about the road. If he must be mounted, take care that his horse is a very slow one; and if you suspect him, let a man ride close behind with his pistol ready to shoot him if he attempts to bolt; tell him of these orders, and he will be careful to save his life. Under the following heads will be found the chief objects to be examined and reported on.

Cities and Villages.—How situated, their population, commerce, and water supply. Are the inhabitants chiefly of the agricultural or of the manufacturing classes. Are they open or fortified: if the latter, of what class, and upon what system. How provided with guns and military stores. Have any large supplies of food been lately collected in them. All attainable information as to their powers of resistance, and the means of attacking them; are they commanded from without; are their suburbs within range of the works; the strength of their garrisons; the name of their commandant; if besieged during any previous war, a sketch of the incidents of the operation, &c. (An officer of engineers should be with all parties sent to reconnoitre fortified places, if it is intended to inspect the works closely.) If open, their capability of defence, the general nature of their buildings, the number of their houses, &c. State their resources in provisions, live stock, transport animals, waggons, and the names of those upon whom requisitions can be most effectively made; the names of the local authorities; the dates when markets are held; is there a post office; the dates and hours when the mails arrive; is there a line of telegraph from it; if not, what is the nearest point at which a telegraph wire passes; how many telegraph operators live there; what are the facilities for baking, &c. The accommodation they can afford in time of war for troops to be stationed there for a few weeks can best be arrived at by dividing the houses into classes, and by visiting one house of each class, estimate the number it could accommodate, and so arrive at a fair estimate of the accommodation afforded by the whole place. See Article on "BILLETS" for the mode of calculating the number of men a house will hold. What is the fuel in use, and is there any large quantity of it in store.

Roads.—Their general width, whether raised or sunken, macadamised, or of sand or clay. (If not regularly paved or macadamised, it may be taken as a rule, that roads passing over soil that retains water are bad, particularly if inclosed by walls or banks. Those passing over coarse gravel, sand or rock, are generally good.) If in good order, inclosed by walls, hedges, banks, or ditches; can troops of all arms or baggage get freely on and off them to the fields at either side; the nature of the soil; cultivated with what crops; general character of the country; whether open or wooded; the fences, whether hedges, ditches, or of stone or wood; what

rivers, streams, cross them, and the nature of bridges over them; of what material, of how many arches or spans, if safe for field or heavy guns. If the rivers are passed by fords; their character and depths; the ascents and descents, and their slope. Roads that join or cross; from where to where, and the distances; towns and villages; can they be avoided by marching round them; what other paths are there to the right and left running in the same direction that can be made available for troops, their nature, &c. If portions are out of repair, whether the material is at hand for repairing it. The distances between all towns and villages to be noted in English miles, also the time taken to march at a walk. All defensible positions; suited for what numbers. If the time permits, rough sketches of them to be made on 4 or 6-inch scale; all good sites for camps, permanent or only for the night, and suited for what numbers. Defiles to be carefully examined.

Railroads.—Their gauge in feet and inches, whether double or single line of rail, description of rails used, and how laid down, whether on continuous longitudinal sleepers, or on cross ties; are they secured by spikes or screws, and what is the mode of fastening them one to the other; what is the easiest method of destroying the line; general description of bridges, of what material, and their length, how to destroy them. The stations, whether large or small; built of what material; the length and breadth of platforms, and what facilities exist for enlarging them and constructing others; whether there are sidings, and means for loading and unloading cattle. The means of providing the engines with water, and whether such means can be destroyed; amount of rolling stock, and description of carriages used; the numbers they would carry of men, horses, guns, carts, &c. Whether the engines are powerful, and in good condition; places along the line where they can be repaired, and where old rails can be re-rolled. What is the general character of the line; whether level, straight, or the reverse; how many sets of telegraph poles, and the number of the wires, and places where the batteries are kept. Whether there are many large tunnels, cuttings, or embankments, and their exact positions. Nature of the country passed through, &c., as described in previous paragraph. The reconnaissance of a railroad is most easily accomplished by an officer travelling over it on an engine at a walking pace; when an engine cannot be used, one of the workman's little hand cars (called sometimes a trolly), which are propelled by a couple of men working a crank, are especially suited for this service.

Rivers, Streams, and Canals.—Whence they rise, and their general direction. Their breadth, depth, nature of their bottoms, banks, and beds; current, and the effect of the seasons on all these points. The quality of their water. Do they freeze over, and when; for what length of time do they remain frozen; does the ice bear men, carts, &c.—3 in. thick will bear men in small detachments, from 4 to 7 in. cavalry and light guns, from

8 to 12 in. heavy guns. If rivers take their rise in mountains, they will be subject to freshets, which must be carefully inquired into; the seasons when they are to be expected; whether arising from rain or the melting of snow. Are they navigable; between what points; nature of boats and their sizes; the number that can be collected at any one place. The position of ferries; number and nature of boats used; number of men, horses, &c., that each can take at a trip; breadth of river at such points. Positions of bridges; their length, breadth, and construction; are they passable by artillery; best method of destroying them; what materials are at hand to repair them if destroyed; the best positions for the establishment of bridges and works to defend them; a section of the river should be submitted with this report: it should be made with the greatest possible care, every yard of the river's bottom being carefully examined with a pole to discover the existence of rocks or large stones: rough sketches of such positions to be given on 4-inch scale; best positions for a passage and for our batteries if the enemy holds the opposite bank; the roads leading to them, where they lead to, &c.; are there points where the bridge could be constructed unseen by the enemy, and from thence floated into position: which are the best points to make a feint of crossing to distract attention from the real point of crossing, &c., &c. The towns or villages on the banks or close by. Islands: their position, size, wooded, or cultivated. Mills and mill-races. The number and size of locks in canals. If easily destroyed, and the best plans for doing so, and how fed with water; nature and condition of their towing paths, &c. The extent to which both rivers and canals can be made to assist in the conveyance of stores, &c. This must greatly depend upon the direction in which they flow. In examining rivers note down the height of old watermarks above their existing level. Sections of rivers should be given for proposed points of crossing.

Common expressions applied to the velocity of rivers.

Sluggish, not exceeding 1½ ft. a second,			or about a mile an hour.	
Ordinary, from 2 to 3 ft.	„	or	2 miles an hour.	
Rapid, „ 3 „ 5 ft.	„	or	3	„
Very rapid, „ 5 „ 8 ft.	„	or	5	„
A torrent, all above 9 ft.	„	or	6	„

The simplest mode of measuring a river's surface velocity is with a common log as used by ships at sea, or by measuring one or more hundred yards on the bank, and calculating accurately the time any small substance takes in floating from one extremity to the other, repeating the experiment several times, and taking the mean. For mean velocity, see "PHYSICAL MEMORANDA," at end of book.

Fords.—Their exact position; their length and breadth; nature of their

bottoms, whether sand, clay, rock, or gravel; do quicksands exist in their vicinity, and do they remain stationary, or do they sometimes form in the ford itself. Are such quicksands very dangerous, or can they be trampled out by camels. Describe the roads and approaches to the ford; the velocity of the water, whether passable at all seasons; if not, at what time of year; general configuration of the ground on both banks; height of both above river; best position to be taken up to defend them; description and position of works to be constructed to cover and defend them; easiest means of destroying them; what houses or villages are near them. The depth for cavalry should not be more than 4 ft. 4 in.; for infantry, 3 ft. or 3 ft. 6 in., according to the strength of the current, and 2 ft. 6 in. for guns and ammunition waggons. Place no confidence in the reports of the people regarding the non-existence of fords. It is very common to find fords about which the inhabitants know nothing. Always examine the fords by crossing them yourself several times backwards and forwards. They are generally to be found above or below sharp bends, and they almost always run diagonally across the river. Those with bottoms of coarse gravel are the best. In seeking for a ford, the easiest plan is to ascend or descend the river in a small boat provided with a short lead line and sounding-pole. It is difficult to render them impassable, but large stones rolled into them, farm-harrows with the spikes upwards, ploughs, planks with long spikes driven into them, trees felled and well staked down, a ditch dug across it, &c., will retard the passage of an enemy for some time. It may sometimes be necessary to use fascines to render fords practicable. In India, where quicksands are common, the fascines are sunk by means of stones.

Mountains.—The valleys must be explored, as along them the roads are sure to be found. For military purposes, a knowledge of the roads, passes, and paths over mountains is all that is required. Are they wooded, cultivated, rocky, or covered with heath; describe the strong positions to be found in them, their general shape, and whether practicable, and if so, where and for what species of troops. The best way of defending the roads and passes; the works that will be required, the supplies to be obtained; at what seasons impracticable from snow, freshets, &c. If possible, mark on your map the general configuration of the line of water-shed. The feasibility of constructing new routes should be reported on.

Forests.—Whether troops can march through or only along the roads; if the latter, the reason. General description of the trees; are there many open spaces; if so, their usual extent. The roads and rivers to be carefully examined; their direction and condition. The necessity and facilities for opening new roads. Are there good positions; can they be turned. Can these woods or forests be avoided altogether by following other routes; if so, describe them. The nature of the country in the vicinity,

particularly where main roads go into and come out from such forests. There is no underwood in beech woods. Forests may be composed of green, resinous trees, such as the numerous varieties of pine, spruce, &c., or of deciduous trees, such as oak, elm, maple, birch, beech, &c., or of a mixture of both. Staff officers should be able to recognise the various sorts of trees commonly met with, and should know their respective usefulness.

Plains and Heaths.—General character, whether cultivated, sandy, or swampy; if suited for large camps; supply of wood and water; nature of roads; the rivers, ravine, or other obstacles; the towns, villages, and houses, &c. All prominent landmarks, such as tall single trees, &c., to be marked carefully on the map.

Marshes, Lakes, Ponds.—Their cause, and how fed with water. If dry at some seasons; where roads cross them, or means of crossing afforded by boats, ferries, &c.; their general character, &c.

Farm-houses and Residences of the Gentry.—How are they generally built; of what material; their roofs; if generally well supplied with forage and provisions; if they generally have vaults under them. Their defensible capabilities; whether easily burnt.

Coasts.—In reconnoitring a coast from the sea, the following points must be entered upon as minutely as possible. The most favourable positions for a force to land: they are generally to be found at points where rivers or streams flow into the sea; if no such exist, the next best are long, low promontories, jutting out into the sea, of about a mile in width, so that the first division landed should, in taking up a position to cover the disembarkation of the others, be able to rest its flanks on the sea, and so have the fire from the fleet to sweep across its front in case of attack. No place is good for the disembarkation of an army unless the depth of water, and the configuration of the coast, and general character of its slopes enables one to derive full advantage from the fire of the fleet; this must always be borne in mind when selecting a point for the purpose.

All bays, inlets, and the mouths of rivers to be carefully examined, with this object in view; the best position to be taken up by the fleet to cover the landing to be noted on the sketch; the roads leading from the shore inland with distances to principal towns. Are there woods near, and what is their extent; are there any wharfs, and what are the facilities for constructing them; is there a dangerous surf, or can boats land at all times. What are the winds that render the approach to the shore dangerous; is the anchorage good; is the bottom sand or rock; what is the height of the ordinary and spring tides; is good fresh water to be had in large quantities upon landing, and is it from wells, streams, or tanks; what is the position and number of the enemy's forces in the neighbourhood. Sound-

ings must be carefully taken, showing how near the different classes of vessels can approach. The prevailing winds and currents; is the coast bordered by downs; are there precipitous cliffs. If there is a beach, is it of mud or sand. In reporting upon a coast with a defensive object in view, the points where landing can be effected are to be minutely examined and sketched. All bays, coves, and harbours to be surveyed, and reports made as to the best means of defending them; the nature of the tides; all islands, towns, villages, and houses on coast to be reported upon; all forts and other coast defences, the nature of their armament, capabilities of defence, their existing garrisons, and the strength their garrisons should be for an effective defence. The best position for camps of observation to guard against invasion, and what is the best scheme for the general defence of the coast.

Scouting.—As long as the opposing forces are at a distance from one another, the front of each will be covered by a screen of cavalry or mounted infantry, or what is still better, by both combined, under the command of one man. From this screen patrols will be despatched at all hours of the day and night to obtain information, and from these patrols scouting parties will be pushed on into the enemy's theatre of operations, worming themselves through his line of outposts or round his flanks. The officers and men in scouting should always go in twos or threes, having been given a place of rendezvous in rear, and a time named when all should return to it, those reaching it after that hour to understand that the others had left, and that they were consequently to make their way back to their regiments at once as best they could; they should avoid the main roads as much as possible, although it is very necessary that they should strike in upon them now and then to ascertain what is taking place there, but as a rule they should keep to by-paths and farm tracks. In England they could do this easily, without running great risk of compromising their safety, as the population would afford them every assistance; but it must never be forgotten that the most valuable information is very seldom to be obtained without danger, and it may often be necessary to lose many men as prisoners, in order to learn what the general requires to ascertain. Every officer employed upon this duty should have in his position a detail of the enemy's army, showing the regiments in each brigade and division, and affording particulars as to the dress and peculiar equipments of each battalion, &c. This information will soon enable him to ascertain what are the actual regiments the enemy's advanced force consists of in his immediate neighbourhood, and when collated from a large number of scouting parties acting along an extending front may enable the commander to estimate with tolerable accuracy the total force that an enemy is operating with. This duty is calculated to give scope for all those virtues of daring gallantry, bold riding, individual prowess, and self-reliance, that we pride ourselves

upon possessing above all other nations. Upon the manner in which it is performed during war much must always depend. I would therefore urge upon all cavalry officers the necessity of learning the use of maps, so as to find their way through a country by means of maps on a small scale. All officers should be able to sketch ground, an art that is now to be learnt by attending a garrison instructor's class.

In every cavalry regiment there should be a party of scouts under the best subaltern in it, and when a cavalry brigade is formed, these several parties should be collected into one under a captain, selected for his special fitness for the duty. In a very mountainous or densely-wooded country where horses cannot be used, these duties must be performed by infantry, as was the case during the late war in Ashanti. Next to courage, daring, physical strength, good horsemanship, good eyesight, and quick intelligence, an aptitude for finding one's way over a country is the qualification most necessary for all ranks employed upon this duty. An officer and two dragoons will frequently be able to penetrate to positions without being observed, and if discovered will succeed in escaping capture in a manner that could not be looked for from ordinary patrols of the usual strength. This system of scouting is now being taught in some of our cavalry regiments, and was practised with the best effect by the cavalry of the southern force during the autumn manœuvres of 1872. The information thus obtained is better and more reliable than that collected by parties consisting of troops or squadrons, and the use of both men and horses is greatly economized.

GENERAL CONSIDERATIONS.—In all the various species of country to be inspected, the wants of an army must ever be borne in mind, and the quantity and quality of fuel reported upon; the slopes and undulations of the ground, the nature of the crops, and of the fences described, whether hedges, stone walls, or rails, &c. The climate should be carefully inquired into. All physical causes supposed to influence it; the temperature in summer and in winter, the length of the seasons, and the dates at which they generally begin and end; the general appearance of the inhabitants, prevailing diseases, and means commonly adopted by the people to guard against and cure them; the principal resources of the country, whether agricultural or pastoral; whether open or inclosed, &c. Give any information you can as to the geology of the country, without entering into technical details: is the soil easy of excavation, and is water easily obtainable by boring wells.

4TH.—THE RECONNAISSANCES MADE DAILY and sometimes several times a day from outposts are conducted by the officers commanding piquets, or by those of the Q.M.G. department, who taking out a corporal and a couple of men, or sometimes going alone, contrive to creep up to commanding

points near the enemy's position, for the purpose of seeing what he is about. They come under the head of patrols when made to any distance beyond the outlying sentries. See preceding Article on "SCOUTING."

MAXIMS TO BE REMEMBERED BY OFFICERS ON RECONNOITRING DUTY.—In conclusion, it must be remembered that to fight can lead to no military result; at the same time many a reconnoitring party has been saved by the boldness of its commander, who finding himself suddenly in presence of a superior force, makes a dash at it, engages it boldly, and is thus enabled to get safely away under cover of the confusion occasioned to the enemy, who judged that he must be strong to do so. The timid or hesitating man would be lost under such circumstances. No English soldier who is well mounted should ever be taken prisoner.

BALLOONS.—One of the most effective means of learning the whereabouts and doings of an enemy is by means of balloons, for although the undulations of the ground when viewed from the car of a balloon at an elevation of about 1000 or 1200 feet do not show, yet the position of troops can be accurately ascertained in close, still weather. Ascents by night, particularly in wooded countries, are most useful for this purpose, as the fires indicate the enemy's position, and his numbers may be roughly estimated, by allowing ten men to each fire.

During an action, a staff officer in a balloon at such an elevation would be of infinite service. The ascent should be made from some height about a mile in rear of the skirmishers; a telegraphic wire from the car should lead to the spot where the general in command had established himself, who could then be kept acquainted with where the enemy's reserves were posted, &c.

MILITARY INDICATIONS.—As stated in the Article on "OUTPOSTS," officers should study attentively the customs of their enemy, their hours for dining, commencing their marches, &c., and the many indications of intended movements which an enemy may unwittingly afford. The collection of boats, heavy guns, scaling ladders, gabions, &c., at particular places, are indications that must always precede the passage of rivers, sieges, &c. If large magazines of stores or provisions are collected anywhere, it is clear that no retreat is contemplated; if, on the other hand, the parks of heavy, or spare guns, ammunition, engineer stores, &c., are being sent to the rear, a retreat is imminent, or being prepared for. The dust raised by columns is a fair guide in some countries as to the numbers and composition of the force marching. That raised by cavalry forms a high light cloud, by infantry a lower and dense one, by parks and baggage one more dense still. With a good glass you can sometimes learn from the manner in

which troops move, and from their dress, whether they are regulars or militia, or if they belong to any special corps. The manner and bearing of the people in a hostile country is usually a fair indication of the public spirit and feeling; if they are gloomy and anxious, it is an indication of want of confidence in their cause, and that their troops are distant; whilst if they are excited and insolent, it shows that they rely upon assistance near at hand, and anticipate success from the number and efficiency of their army. In following a retreating army, much can be learnt from its trail; if the *débris* of arms, accoutrements, &c., lie about, there is a want of transport, and it is a sign of demoralisation according to the extent to which it is the case; large numbers of graves indicate the existence of disease in the enemy's army. The places where they halted for the night should be carefully examined; and all indications carefully noted. Did they bivouac or pitch tents; was their camp laid out with regularity; were their cooking places neatly made (in India much can be learnt from examining them, for when hurried the natives make but few, preferring to eat uncooked messes, to forego the requirements of their caste in such matters). Is their track strewn with dead, or dying transported animals; have they plundered the inhabitants or burnt their crops or houses; have they effectually or only partially destroyed the bridges, &c. The most insignificant circumstances afford sometimes whole pages of information to officers who, having studied the manners and customs of an enemy, know how to interpret them aright. Officers commanding small detached parties sent out on reconnoitring duties, may many times avoid falling into the hands of strong patrols or detachments, by learning their proximity from their track if crossed anywhere; the number and composition of such detachments may easily be estimated from it.

MARCHES.—To arrange for the march of a force consisting of all three arms of the service, especially when a collision with the enemy may be expected, is a staff duty of the highest importance. Success in most wars depends very much upon the manner in which this duty is performed by the staff, and upon the manner in which the arrangements ordered have been carried out by the troops. Let me see two armies on the march, and I believe I could tell you the respective fighting value of each.

There is one general principle which applies to every description of march, no matter when or where it may be undertaken, i.e., always march in as many columns as you can, and let each column march upon the largest possible front. The number of columns you can march by will generally be decided by the number of roads more or less parallel one to the other, leading in the required direction, remembering that when far away from an enemy you may extend your columns to the right and left greatly beyond the space you occupy in fighting, contracting your front the

nearer you approach him, so that when within striking distance you do not cover more than your front of battle.

When it is possible, cavalry and H.A. should march by a different road from the infantry, as it is very fatiguing to horses to keep pace with men on foot. If this cannot be done, large intervals should be allowed between the mounted and dismounted branches of the service when on the march. Unless the country is deep or very much cut up by canals, cavalry can generally make its way across the fields, having a detachment of mounted sappers with tools carried on pack-horses for the purpose of opening ways through and over obstacles.

When far from the enemy all your arrangements for the march must be made with a view to the comfort of your troops, and to the convenience of supplying their daily wants, unless you have some object of primary importance, such as great rapidity of movement for purposes of concentration, in which case, of course, everything must give way to it.

The fitness of troops for the great final struggle, when they at last meet their enemy, must ever depend greatly upon the manner in which their marches have been arranged. Men overmarched, or whose health and comforts have not been duly attended to whilst on the march, can never be expected to go in at an enemy whose men have been well cared for by an able staff administration. It behoves those staff officers who have to make arrangements for a march to take good heed that everything has been thought of and provided for beforehand.

All our Regulations are based upon the rule that tents are to be carried for every one, and that the army is to encamp every evening. In Europe the army that attempts to make war upon this system will most certainly be beaten by an army that carries no camp equipment, but that bivouacs and makes use of the shelter afforded by villages and farm-houses, &c.

In arranging for the march of an army, the Q.M.G. or chief of the staff will merely indicate the position to be occupied by the head-quarters of the army corps every night, and the hour that the corps should be at its destination in a fighting condition, taking care, however, that the march of no two should clash or cross one another, which is always possible when a road occupies a sort of neutral position between two corps: under such circumstances it will be for the chief of the staff to state in orders which corps is to use it.

In selecting the position for the headquarters of an army or of any force, the rule should be to fix them in as central a place as possible: this is, however, subject to many modifications depending upon the roads, and the facilities for communicating orders and receiving them from your own Government: the existence of a telegraph-wire along any road would generally point it out for head-quarters in preference to others.

The senior S.O. or the Q.M.G. of each army corps will make all the

arrangements for its march, indicating generally the roads the three divisions are respectively to march by, and how communication is to be kept up between them whilst on the march, and stating the villages or exact locality where the headquarters of each are to be every night. The same will be done for each division by its senior S.O., who will go fully into details as to the hour of starting, the advanced and rear guard, &c., &c., as shown in the supposititious orders given farther on for the division detailed as the advanced guard of the army.

In moving an army it is desirable, if possible, that only one division should march by each road. The largest unit that can at all conveniently march by one road in a continuous column is an army corps; but its pace will be very slow, and great fatigue will be entailed upon men and horses.

Orders for a march should contain:—

1st. General direction and object of the march.

2nd. Date, hour, and order of the march, and the roads to be followed by each division, &c., &c.

3rd. Formation of advanced or rear guards, and special instructions for flanking parties and detachments of all sorts.

4th. Instructions for field hospitals, reserve ammunition, engineers, pontoons, and military portion of the train generally.

5th. Instructions for supply of troops and orders for baggage and provision columns.

6th. Position of general on the march, and of headquarters for the night.

In order more fully to explain the movement of an army, we will suppose that one, consisting of two army corps and a reserve brigade of heavy cavalry, assembled on a front of about 10 miles, between the villages A and B, is to advance and attack an enemy, or take up a position in his neighbourhood at C, D, which is 80 miles distant. Let us assume that it has not been thought advisable to detach the cavalry to the front as an independent force to cover the army. The army during its march to be always ready to form line of battle before its advanced guard could be overpowered, all its columns being in constant communication with one another, and the headquarters being as near the centre as possible.

Even such a simple movement as this requires much nicety of arrangement. If speed is an object, the difficulty is increased tenfold, for when a flooded river, a broken bridge, or other obstacle is encountered on one of the roads by which the advance is made, the delay can easily be remedied if the army is moving by short marches, but if it is doing 20 miles or more a day, the delay of one column may derange the plan laid down for all.

Let us assume that 4 roads, with intervals of from 2 to 3 miles between each, lead from A, B, to C, D, No. 1, on the left, being hilly, and generally unsuited for wheeled conveyances; the next one, No. 2, is the main road,

paved or macadamised throughout; the next, No. 3, is a good country road; the last, No. 4, is a clay road, passing through an open country.

The following would be the orders, sent either in a memorandum to the generals commanding army corps, or published in general orders, as might be thought best; they should be issued by the chief of the staff.

Memorandum, or General Order (as the case may be).

Army Head-Quarters, ————————,
4th June, 1874.

1. The army will advance on Wednesday the 6th inst. in the direction of C, D; the 1st army corps by No. 3 road, the 2nd by No. 2 road, and the reserve cavalry brigade by No. 4 road.

2. Each army corps will be covered by an advanced guard consisting of its cavalry brigade, &c., &c. (*see Article on Advanced Guards*). The advanced guard of the 2nd army corps will cover No. 1 as well as No. 2 road by which that corps is to march. The advanced guard of the reserve brigade of cavalry on No. 4 road will consist of one regiment of cavalry, 2 H.A. guns, and the odd battalion of the 1st army corps that will be attached for this purpose to the reserve brigade of cavalry until further orders.

These advanced guards will march to-morrow the 5th inst. at 6 A.M., constant communication to be maintained between the advanced guards on all four roads; they will halt for the night in the neighbourhood of the villages E, F, G, and H.

The men will take rations for the day in their haversacks; corn for the day to be carried by each horse; hay to be obtained by purchase from the country. Rations and corn for one day to be taken in waggons with each advanced guard, to be replenished daily from supplies with main body in rear: these waggons will not march to-morrow until noon.

3. A route will be sent (or is forwarded with this, as the case may be) to all general officers, and to the brigadiers commanding advanced guards, indicating where the headquarters of the army, of the officers commanding the advanced guards, and of each army corps, will be each evening during the movement.

4. The officer commanding each advanced guard will, as soon as possible after each day's march, report the events of the day to the G.O.C., the column from which he has been detached, accompanied by a road sketch giving the fullest possible information as to the country, supplies, &c.

5. The distance to be maintained between the advanced guards and the columns in their rear will be about four miles.

6. Army headquarters will march by No. 2 road: the C.-in-C. will march at the head of main column of 2nd army corps.

(Signed) G. J. W.,
Chief of the Staff.

The orders issued by each general officer commanding an army corps, a division, or an advanced guard must be of a much more detailed nature. As an example we will sketch out here those that, under the above circumstances, would be issued by the brigadier detailed to command the advanced guard of the 2nd army corps.

Advanced Guard Orders, 2nd Army Corps' Camp,
4th June, 1874.

1. With reference to G.O. No. 2, of this date, all reports from the 2nd cavalry brigade will be made in future to these headquarters; its major of brigade will attend here daily for orders, as soon as possible after the march is over.

2. The advanced guard 2nd army corps will march to-morrow at 6 A.M. in the direction of C, D.

3. A detachment consisting of the 1/60th Rifles,* the 7th Hussars,† 2 guns from —— Battery of H.A., a party of 20 men R.E. with tools on pack-horses, and an ambulance detachment, will march by No. 1 road. It will parade this evening at 5 P.M. immediately in front of —— Regiment, and proceed to the advanced post near the village of ——, on No. 1 road, which upon being relieved will rejoin its brigade. This detachment will begin its march to-morrow punctually at 6 A.M. Colonel B. J. will command this detachment until further orders, and will arrange his own order of march.

4. The following arrangements to hold good for to-morrow and for all marches made subsequently, unless orders are issued to the contrary.

5. The order of march for the main body of the advanced guard on No. 2 road will be as follows (see page 227).

6. No bugling, beating of drums, or playing of bands will be allowed in camp or on the line of march without the express order of the brigadier commanding the advanced guard.

7. The men will to-morrow be roused at 4.30 A.M. (and on all subsequent marching days, one hour and a half before starting), and will at once pack the baggage waggons: they will breakfast at 5 A.M., and will fall in punctually at 5.30 A.M. on their private parades, and will form up in the column of route on the road, so as to be ready to march punctually at 6 A.M. The vanguard will always parade half an hour earlier than the main body, so as to be formed up at the outlying piquet on the main road, and ready to start at 6 A.M.

* *This to be the odd battalion of the division furnishing the brigade of infantry for the advanced guard.*

† *This to be the regiment of cavalry belonging to the division furnishing the brigade of infantry for the advanced guard.*

8. The vanguard to-morrow will consist of the 10th and 13th Regiments of Hussars, —— Battery of H.A. without waggons, —— Company of R.E. with tools on pack-horses, and the 90th Light Infantry without its band, all under the command of Lieutenant-Colonel ——. Upon halting for the day the front to be covered with outposts to be posted by that officer, and taken from the force under his immediate command. The piquets to communicate with those on Nos. 1 and 2 roads.

9. There will be a halt of 5 minutes in every hour; the first being at 6.30, the second at 7.30, and so on, as it is essential that every one should halt at the same moment.

10. All corps will march upon the largest front that the routes will admit of.

11. The brigadier commanding will march at the head of the main body on No. 2 road.

(Signed) G. J. W.,
Senior Staff Officer, Advanced Guard 2nd Army Corps.

In issuing orders for subsequent marches, but little need be said beyond that "the advanced guard will march to-morrow at —— A.M., in the same order as specified in orders of 4th June."

The length of ordinary marches, for a force not stronger than one division, moving by one road, should be from 12 to 15 miles a day for 5 days out of 6, or at most, for 6 days out of 7. At the opening of a campaign, it is essential that you should begin to practise your men in marching as soon as possible, and even during any long halts occurring in a war, give your men plenty of route marching. When there is no necessity for haste, begin by short marches of 6 or 7 miles, gradually increasing their length until your men are in good marching condition. If the men breakfast at 7 A.M., being roused at 6.30 A.M. and starting at 8 A.M., they ought to be at their new bivouac or camping ground, 6 miles off, at 10.15 A.M., and their dinners should be ready at noon. Ordinary marches of 15 miles in fair weather and over average roads should not occupy more than 8 hours.

As soon as the men are in good marching trim, the distance should be increased to 12 or 15 miles. In extensive operations, however, when large forces have to be moved, not more than 10 miles a day for continuous marching can be calculated upon.

The rate of Marching.—In calculating the time occupied in marching certain distances, a division with all its *impedimenta* can march $2\frac{1}{2}$ miles an hour if the arrangements are very good, but in large combined operations, unless the weather is very fine, and the roads very good, the time should be calculated at the rate of 2 miles an hour only. The ordinary hourly halts of about 5 minutes each are included in these estimates. If

the roads and weather are bad, and the country deep, large bodies of troops will not do more than 1 or 1½ miles an hour.

Our quick time is at the rate of 3·3 miles an hour without halts. When moving in small bodies independently, the rate of marching on fair roads may be calculated thus: for infantry, 2¾ miles an hour; for cavalry and H.A., 5 miles; and for field artillery, 4 miles an hour (ordinary marching halts included). The larger the force moving upon any one road, the slower will be the pace. Baggage trains under a good military organisation can do 3 miles an hour well, and if properly looked after, the animals being good, can do from 90 to 100 miles a week. No march for the train should exceed 25 miles, and this distance should be exceptional. When civilian transport is used, not more than 2 or 2½ miles an hour as a constant rate for large trains can be calculated upon.

Order of March.—In issuing orders for the formation of columns on the march, the nature of the country, the fighting characteristics of your enemy, and the object to be attained, must be duly considered, as troops, guns, ammunition, &c., &c., should be placed in the columns in the order in which each is likely to be required: when there is a possibility of having to fight, tactical considerations must be first provided for, but when at a distance from the enemy, the comfort of the troops and the convenience of supply should have most weight in determining the order of march.

Let us first sketch out what would be the normal order of march of an army corps moving by one road when the front was not covered by a detached and independent force of cavalry. The advanced guard of a strength as detailed at page 239 would march as follows (the length of road occupied by each regiment, battery, &c., is given in yards opposite each):

Vanguard.—1 regiment of cavalry forming a line of patrols to a distance of about a mile in front and on each side of road, having scouts pushed out in all directions, about half a mile still farther.

An interval of from about 300 to 600 yards.

	yds.
1 Regiment of cavalry having 2 squadrons on road, and one on each side of it at a distance of about 500 or 800 yards from it. . . .	216
1 Battery of H.A. without waggons	190
1 Company of R.E. with tools on packhorses.	100
1 Battalion of infantry without band	320

Interval of from 500 to 1000 yards.

3 Squadrons of cavalry	340
1 Battery of H.A. without waggons	190
1 Brigade of infantry.	1080
1 Company R.E. with tools in waggons, and light bridge equipments	400

	yds.
The waggons of two batteries H.A.	520
Regimental S.A.A. and tool carts	192
Led horses	140
Ambulance	80
1 Squadron of Cavalry	108

An interval of 1 or 2 miles.

Main body :—

The G.O.C. and his combatant staff	50
The G.O.C., 1st division	20
1st Division cavalry regiment, keeping up communication with advanced guard	440
1 Battalion of leading brigade	340
The 3 field batteries of 1st division	1200
Remaining 2 battalions of leading brigade	740
S.A.A. carts of leading brigade	108
Tool carts of leading brigade, and forge waggon of cavalry regiment	52
Infantry and artillery reserve ammunition of 1st division	790
1 engineer company and its tool waggons	165
Ambulance and field hospital	120
Army corps batteries (1 H.A. battery being with advanced guard)	1800
Led horses of army corps staff and of 1st division	125
Interval	200
G.O.C. 2nd division	20
Odd battalion of 2nd division	340
1st brigade, 2nd division	1110
The 3 field batteries of 2nd division	1200
S.A.A. and tool carts of odd battalion and of 1st brigade	192
2nd brigade, 2nd division	1110
S.A.A. and tool carts of 2nd brigade	144
Infantry and artillery reserve ammunition column, 2nd division	790
1 Company R.E. and its tool waggons	166
Ambulance and field hospital	150
2nd Division regiment of cavalry	440
Led horses of 2nd division	104

Interval of about 100 or 200 yards.

The 3rd division in same order as the 2nd.

Interval of about 200 yards.

Army corps reserve ammunition columns	1590
Pontoon troop	660

	yds.
Telegraph troop	250
Detachment of military police	40
Interval of from 100 to 2000 or even 3000 yards according to the probability of fighting.	

Baggage Column :—

Detachment of military police	40
Non-combatant staff of army corps	10
Baggage of army corps, headquarter staff	80
Baggage of the cavalry brigade and of the 3 divisions in the order in which each corps stood in the column of route, the non-combatant staff being at the head of the baggage of each division: no tents carried	2300
Commissariat trains	5000
Troop of military police	150

The advanced guard from the scouts to the rear of the squadron closing its rear would cover about 4 miles of road. The main column from its head to the rear of military police closing in its rear would occupy about 13 miles. The column of baggage, exclusive of all commissariat trains, would cover about $1\frac{1}{2}$ miles, or with those trains, say $4\frac{1}{2}$ miles.

Allowing about a mile as an interval between the advanced guard and main column, and 20 per cent. for unavoidable opening out (the commissariat trains being as above), the army corps from the scouts of the advanced guard to extreme rear of trains would cover about 26 miles of road, no tents being carried.

The order of march for a division moving independently, when no detached force of cavalry covered the front, would be normally as follows:—

Advanced guard, strength as given at page 239.

2 Squadrons of cavalry with patrols pushed out to a distance of about a mile or half a mile to the front and to each flank.

Interval of about 300 to 500 yards.

	yds.
1 Squadron of cavalry	108
1 Company of infantry	35

Interval of 300 or 400 yards.

3 Companies of infantry	110
2 guns, H.A., without waggons	63
Section of R.E. with tools on pack-horses	60

Interval of from 500 to 800 yards.

	yds.
O.C. the advanced guard and staff	12
4 Companies of infantry	150
2 or 4 guns H.A. without waggons, according to circumstances, if 4 guns	128
Remainder of R.E. with tools and waggons, and perhaps light bridge equipment	150
Waggons of H.A. battery	260
S.A.A. and tool carts of infantry battalion	48
Led horses	75
Section of ambulance	40
1 Squadron of cavalry	108

Interval of from a half to a mile.

Main body :—

G.O.C. and his staff	20
1 Troop of divisional cavalry keeping up communication with advanced guard	54
The leading battalion of leading brigade	340
Divisional artillery (3 batteries)	1200
The 2 remaining battalions of leading brigade	740
S.A.A. carts of leading brigade	108
Tool carts of leading brigade and forge waggon of cavalry regiment	52
The 2nd brigade	1110
S.A.A. and tool carts of 2nd brigade	144
Infantry and artillery reserve ammunition column	790
Ambulance and field hospital	150
Led horses	104

Interval of from 100 to 1000 yards, according to the probability of fighting.

Non-combatant staff	10
Detachment of military police	30
Baggage of divisional headquarter staff	48
Baggage of brigades, &c., according to the order they occupy in the column of route	1050
Commissariat train	1000
Military police	120

The advanced guard from leading scouts to its rear would occupy $2\frac{1}{4}$ miles of road. The main column, with baggage and train, would occupy about $4\frac{1}{2}$ miles of road, no allowance in either case being made for unavoidable opening out.

Allowing 20 per cent. for opening out, and 880 yards as the interval between advanced guard and head of main column, and a similar interval between rear of column and head of baggage column, the whole division would cover somewhat under 8 miles of road, no tents being carried.

In the foregoing orders of march the commissariat trains are placed after the baggage, it being presumed that the men are carrying a day's provisions in their haversacks, as must invariably be the rule when there is any possibility of meeting the enemy: when they do not carry rations with them, the waggons carrying one day's rations for every one should precede the baggage.

Previous to all marches it is very necessary that the P.M.O. and the controller should receive the earliest possible notice so as to make the necessary arrangements beforehand. As the enemy is most likely to receive information through contractors, it may sometimes be essential to keep the controller in ignorance of your intentions; upon such an occasion the C. of the S. must satisfy himself that there are ample supplies at hand. A very successful plan sometimes for deceiving an enemy is by the formation of magazines at points far removed from your intended line of movement. With the advanced guard there should be no hospital, and only a small ambulance establishment, the sick to be collected every day, and left—under cover if the weather is bad—in charge of a medical officer until the main body arrives, when they will be provided for by the P.M.O.

In open countries like India, the advance of armies is an affair that can be laid down on paper: the baggage being mostly carried upon elephants, camels, and bullocks, marches, independent of roads, upon the flank which is least open to attack.

In future European wars, it may be expected that the advance of armies will be parallel with railroads, along which supplies can be forwarded as required.

The electric telegraph is a new element in war; wires can easily be laid down as each column advances, by which messages can be sent back to the original starting-place, and so to the front along the road upon which the C.-in-C. is marching: in other words, he can be in momentary communication with all his columns. Such was the case when the Prussian armies advanced from their frontiers into Saxony and Bohemia in 1866.

The season of the year, the distance to be got over, and the climate must determine the hour of setting out; it should be an understood thing, however, that the men should have their breakfast before starting; when the marches are over 15 miles the men should halt for dinner, and have an evening meal when they reach camp.

In warm weather the earlier that infantry march the better, but one hour after daybreak is more convenient for cavalry and artillery, as horses feed

better then, and the men have light to arrange their saddlery and harness, which is generally badly done for marches begun in the dark.

Brigadiers and general officers should stop frequently to see that the order of march is kept regularly: it is a good plan for all commanding officers to see their men file past them once every day on the march. They should from time to time send their A.sD.C. along the column to the rear, to see that all is going on well, and to report any irregularity.

Each division must be led by its A.Q.M.G., who is responsible that the correct road is followed. He must obtain the guides, marching with one himself in front of the advanced guard, one to keep with the head of the column, one with the tail of it, and one with the rear guard.

During night marches it is advisable to have one or two others distributed at equal distances along the column: for the treatment of guides, see Article on "RECONNAISSANCES." The orders for each day's march should be communicated by the senior officer of the Q.M.G. department present with the column, to the senior officer of the A.G. department, who issues the daily orders (a routine which is necessitated by our division of the staff into two departments). With an amalgamated staff the arrangements for the march are made, and the orders given by the same S.O.

Unless there is some urgent necessity for speed, halt always one day in the week; in fact, the main features of the march depend upon the enemy's proximity, the nature of the country (which bears greatly upon the facilities for lateral communication between the columns), the relative strength of the opposing forces, and the objects in view.

The mode in which the army daily encamps or bivouacs (as the case may be) must depend upon the same circumstances. If obliged to fight at any moment, the two infantry brigades of the advanced guards can quickly form to the front, on their leading regiments; one forming to the right, the other to the left, the brigades of cavalry forming up on their outward flanks (having left strong patrols on all the roads leading towards the enemy) will endeavour to check the enemy by threatening or charging his flanks. The army in rear will thus have time to deploy into fighting order.

THE DUTIES OF THE STAFF are endless during the march, and, no matter how zealous the junior S.O.s may be, unless the C. of the S., or Q.M.G. (as the case may be), is experienced in war, and a man of ability, roads will become blocked up with troops, waggons, &c.; advanced guards will find themselves without columns in their rear; brigades and divisions will lose their way, not knowing they have done so, until their leading battalions have been pulled up short by an impassable marsh, bridge, or river; baggage will be lost; short marches will be badly executed at the cost of immense fatigue to men and animals; and if attacked *en route*, nothing but

the individual physical superiority of the Briton over all other nations can save the honour of Her Majesty's army.

The minor details to be attended to by officers commanding battalions and brigades, as well as those on the staff, are numerous. The following sketch is a general outline of them :—

The physical condition of the men and horses is of the most vital importance. Both must be well fed during the march, for the wear and tear upon the system is much greater than when halted ; an extra allowance of meat and tea should always be given. See Article on "DIET."

The men's stomachs being attended to, their feet come next, and are of equal importance ; good shoes and woollen socks are indispensable, the latter to be washed whenever there is a halt.

Captains of companies should impress upon their men the necessity for greasing their boots, which, while rendering them waterproof, also makes them soft : they should be instructed to soap their stockings for the first few days' march, taking care to wash their feet and prick any blisters that may have risen, as soon as they encamp. It is a good plan to rub the feet with a decoction of salt and a little alum dissolved in warm water.

Men who suffer in the least from ingrowing nails must have their feet examined by the doctor. Whenever the force halts for a day, captains must examine their men's boots, and take immediate steps for supplying all wants in that respect. The old prejudice against drinking water on the march has been murdered by scientific discoveries : however, men should be discouraged from drinking large quantities at a time, and persuaded instead to drink a little frequently.

Make use of the "double" as seldom as possible. It looks very smart, no doubt, to perform movements at a running pace, and some commanding officers are very fond of doing so on the march, but the colonel who thus "takes it out" of his men, is ignorant of his work. If distance is lost, wait for the next halt to regain it.

Whenever it is possible, have music to march to. If the band is broken up, the drums and bugles should play together as the French do. Nothing is more martial in sound, and the men march a hundred per cent. better to it than in silence. If you have nothing else, get your men to sing by companies. During long night marches in India at the beginning of the mutiny, I found that with singing we got on admirably, whilst, when we marched in silence, as men will do after the first half mile at night, they almost went to sleep, lagged behind, stumbled and fell. The moment a song was struck up the men stepped out briskly.

There are no occasions on which the discipline of a regiment becomes more conspicuous than upon the line of march, nor on any on which the attention and vigilance of every officer in maintaining order and regularity are more especially requisite.

Officers of all ranks must be sensible of the importance of preserving the compact order of a column of march, by not allowing irregular intervals, straggling, or falling out, except during periodical halts, which should be frequent and at a distance from public houses. All marches are to commence at as early an hour as the season of the year will admit of.

After a march, the men are to occupy themselves in putting their arms and appointments in complete order.

Drunkenness, or irregularity upon a march, is to be considered as committed on duty.

When not likely to be engaged, and when tents are used, it is desirable that the Q.M.s and the camp colour men of the advanced guard should march at the head of the column; those of the columns of the main body, with their respective advanced guards, but in rear of them. This will save much time when the several columns approach their encamping ground.

When marches are undertaken beyond the enemy's reach, they can best be accomplished by divisions, or perhaps by even smaller bodies. The greater the number of detachments of about 6000 each, and the greater the number of roads marched over, the easier it will be to administer to the wants of every one. In such cases, the comforts and physical condition of the men must be closely attended to, and must regulate the length of the march and the hour of commencing it; when there is any likelihood of being engaged, military considerations must outweigh all others. Avoid unhealthy and malarious districts; but if obliged to pass through them, arrange to halt the fewest possible number of nights there, beginning the march about noon in cold countries, and somewhat later in hot.

Places like the Terai in India are mostly deadly at certain seasons, if the nights are passed there, although one may safely march through them in the middle of the day. It can generally be traversed in one march, but if obliged to encamp in it, every tent should be closed after sunset, and kept closed until an hour after sunrise. Guards should be reduced to a minimum, and every man on night duty should be given 3 grains of quinine, both going on and coming off duty. The Indian medical men recommend that every man obliged to halt in malarious places should receive a daily ration of quinine, and in such cases the expense of physic ought not to be considered.

No matter what the length of march, or how distant it may be from the enemy, all the precautions necessary when in his presence must be adopted.

Avoid marching through towns or villages. Go round them if it can possibly be done. When that is impossible, take every precaution to prevent the men from leaving the ranks. Under no circumstances should a temporary halt occur within such places. To avoid doing so, the place

of exit must be kept clear. If any obstruction occurs a little in advance, the column marching through the town must not be halted, but kept passing through and forming up beyond it, until the check has been remedied.

When starting, if in the neighbourhood of the enemy, the men must not burn up the straw and rubbish of their camp and bivouac.

At the head of every column of less than a division should march as a detached body all the regimental pioneers, who should take their orders from the officer of the Q.M.G. department on the spot. This is not necessary when a company of engineers with tools accompany the column.

If the obstacle to be overcome is only a small one, care must be taken that only sufficient pioneers or engineers are left behind to accomplish what is necessary; the rest should go on with such portion of the column as can get on, notwithstanding the obstruction.

Wherever the road divides into two or three branches, the Q.M.G. of the force must take care to make a mark by notching the trees or breaking down some branches along the road that is to be followed. A pile of turf or stones will serve the same purpose. During night marches, unless there are a number of guides, a mounted officer or man should be left to point out the way at all places where roads branch off from the one you are following.

The discharge of any firearms during the march is strictly forbidden.

March in the most open order when at a distance from the enemy. This is all the more necessary in hot weather and in the tropics. I have seen men drop down dying in India from being marched into action in contiguous quarter distance columns, in the centre of which the want of air was actually suffocating. For this reason, fours is a bad formation in hot weather. Companies, sub-divisions, or even sections, are the best formations to be adopted, according to the breadth of road.

Officers commanding companies to be held responsible that the water-bottles are filled before starting. Take your men cool into camp, and do not allow them to remove their coats for half-an-hour after reaching camp.

When tents are up or the bivouac marked out, as the case may be, the men not employed on fatigues should change their under clothing and wash well. The clothes taken off to be brushed or beaten, and hung up in the wind.

In marching with other corps, officers commanding battalions must be careful to prevent anything approaching to a check taking place at the head of their column. If a narrow bridge or gateway has to be passed, it should be done at the double or stepping out. General officers cannot be too severe upon commanding officers who are negligent on this point.

Whenever a stream, ditch, bank, or other obstacle is to be crossed, it will be generally found that, instead of defiling or diminishing the front, the very contrary should be

done, not only by causing the files of each section to open out gradually before they arrive at the ditch or obstacle, but even by forming subdivisions or companies.

When a bad place is to be passed the majors and captains will go to the head of their respective wings and companies, to see that any orders which may have been given are obeyed with regularity and steadiness. They will remain at the spot till the whole of their wings or companies have passed, and will then resume their stations in the rear, and give the words, 'March at ease.'

It is of the greatest importance that the men should not on any account be hurried on the march; they are to be instructed that they are never to step out beyond the regular step, still less to double, unless by word of command.'

No man is to remain behind or quit the ranks for any purpose, or on any account whatever, without permission from the captain or officer commanding the company.

Officers are never to give permission to any man to quit the ranks excepting on account of illness, or for the purpose of easing themselves, or for some other absolutely necessary purpose.

The officers must be particularly attentive to prevent the men from going out of the ranks for water. When this is required the regiment or column will be halted.

Men who obtain permission to fall out for a short time to ease themselves, or for any other cause than illness, must invariably leave their arms and packs to be carried by the section they belong to until they return.

The following Table gives the actual number of yards in depth occupied by regiments, brigades, &c., marching along a road in perfect order. As opening out to some extent is unavoidable, 20 per cent. should be added to all these distances in calculating the depth of a column of route.

Colonel Colley gives the following good rough rule for calculating the length of road occupied by columns on the march; allow 1 yard for each horseman, 1 yard for every 2 foot-soldiers, and 20 yards for every gun and for every description of waggon.

An army moving to fight must be encumbered as little as possible by baggage and waggons of all sorts: tents and provision trains should be left in rear, the men being served out with 2 or 3 days' provisions. The fighting portion of the army to be closed up to the front as much as possible. The Prussian system of keeping open the communications with the base, by means of an organisation entirely independent of the manœuvring army, is admirable, and should be adopted by us. Our Militia, or even Volunteer corps, would be well suited for this work; instead of having to fritter away your fighting strength by detachments to protect your magazines, fortified posts, railways, important bridges, &c., in rear of the army, and to provide for convoys, battalions of these "reserve forces" might be used for those duties.

Baggage.—Happily for our army the system of regimental transport has now been definitely adopted. It is essential that there should be a good

UNITS ON FULL WAR STRENGTH.	Number of Yards of Road occupied, allowing for Regulation intervals. Infantry in fours, Cavalry in sections, R.A. in column of route, Transport Waggons in file.
	yards.
A Squadron of Cavalry (54 files) without baggage .	108
A Regiment of ditto, with baggage but without tents	575
Ditto ditto, with tents and all regimental transport.	640
A Brigade of ditto, with baggage but without tents*	1,875
Ditto ditto, with tents and all regimental transport*.	2,070
A Battalion of Infantry, with only tool and S.A.A. carts	380
Ditto ditto, with all baggage, &c., except tents . .	516
Ditto ditto, with all its regimental transport . . .	564
A Brigade ditto, with only tool and S.A.A. carts. .	1,230
Ditto ditto, with all baggage, &c., except tents . .	1.638
Ditto ditto, with all regimental transport . . .	1,782
A Battery of Horse Artillery	450
A Battery of 16-prs.	380
A Field Battery of 9-prs..	340
A Battery of H.A. without waggons	190
A Divisional Reserve Ammunition Column . . .	790
One Division Army Corps ditto . . .	530
Army Corps ditto ditto . . .	1,590
A Field Company, Royal Engineers	166
A half Telegraph Troop ditto	250
A Pontoon Troop ditto	660
A Divisional Ambulance Column	..
One Field Hospital	..
One Infantry Division marching independently with an Advance Guard and its baggage, as shown at page 229	12,000†
One Infantry Division without baggage as part of an Army Corps as shown at page 228 . . .	5,766†
	Including an interval of 4 yds. between the leaders' heads, and the rear of the waggon in front of them.
A two-horse waggon	12 yds.
A four ditto ditto	16 „
A six ditto ditto	20 „

Allowance is made in this Table for space occupied by Infantry but not by Cavalry Bands.

* 3 *intervals of* 50 *yds. each allowed between Regiments for convenience in marching.*

† *These numbers include the Company of R.E. and the R.E. Equipment Trains; also the police.*

active officer in charge of the baggage of each division. The baggage master must be considered a S.O. whilst on the march, and as such, being the mouthpiece of superior authority, his orders must be obeyed. He will be, during the march, the S.O. to the F.O. of the day, who, commanding the rear guard, can, if necessary, give him orders; but, unless under peculiar circumstances, it is better that he should leave him to make his own arrangements; supporting him if appealed to by him on questions of authority.

After the march he will report to the A.Q.M.G. all irregularities that may have occurred, or the negligence of any officer with the baggage guard, and will make suggestions regarding the baggage on future occasions.

The baggage of corps should be kept together, and not allowed to mix with others; this must be attended to by the regimental officer permanently in charge of the transport of each regiment, who will distribute his guard amongst it with that object in view. One N.C.O. should be with the leading and one with the last cart. Under no circumstances must the guard be allowed to ride on any of the animals, or in any cart, or to put their arms or packs there. The officers cannot be too strict in preventing their men from straggling, and all stragglers should be made prisoners.

If a load tumbles off, or a cart breaks down, the whole of the baggage of that regiment is to draw up on the near side of the road, allowing that of other corps to pass on. The guard must then, under the directions of the officer, repack the load, or, if necessary, distribute it in small quantities amongst the others. Officers commanding regiments should take steps for punishing those whose baggage tumbles off, for if carefully packed it would not do so under ordinary circumstances.

Allowance of Personal Baggage.—Transport will be found in the field for 80 lbs. for all regimental field officers and others ranking as such (brevet rank not included); for 60 lbs. for mounted officers not being field officers; and for 40 lbs. for all officers of inferior rank. This includes bedding, &c., but does not include cooking utensils, for which transport will be found at the rate of 22 lbs. for each troop or company, or mess of 3 officers. Baggage to include bedding, will be conveyed for civil servants (when authorized) at the rate of 20 lbs. each: camp equipment will also be provided for them.

Advanced Guards.—No body of troops, from an army down to a company, should march without being covered by an advanced guard. It fulfils for troops on the march the same duties that outposts do when they are halted, and the same rules apply to both.

Its object is to search the country in the vicinity of the roads by which a force marches, for the purpose of ascertaining what the enemy is about, so that he cannot possibly take it unawares.

In their composition they should represent a miniature army, the pro-

portion between the three arms being decided upon the same rules that hold good in the formation of an army for each particular sort of country.

It is the duty of the A.Q.M.G. or the senior S.O. with the division to see the advanced guards properly detailed and formed up, as also the rest of the division. The officers in charge of the baggage, stores, &c., must take their orders from him as to the position they are to occupy on the line of march.

The following may be taken as the normal strength of the advanced guard required by an English army corps and division respectively, when the front is not covered by an independent force of cavalry pushed forward as detailed farther on, and as described in Article on "SCOUTING."

For an Army Corps.—The brigade of cavalry with its battery of H.A.; 4 battalions of infantry; any mounted infantry there may be attached to the army corps, 1 battery of H.A: 1 or 2 companies (according to circumstances of R.E. with a light bridge equipment, and an ambulance detachment.

For a Division marching independently.—The divisional regiment of cavalry minus 1 troop (to be left with G.O.C. at head of main column): the odd battalion of infantry not attached to either brigade; 4 guns, or in some instances an entire battery of 9-prs., any mounted infantry there may be available; one company of R.E., and a detachment of the ambulance.

The fewest possible number of non-combatants should be with all advanced guards.

Their distance from the main body must greatly depend upon the relative condition of the two opposing armies: if you are prepared to attack whenever you come up with the enemy, the distance should be small, say about a mile, but if you consider it will be necessary to devote some time to reconnoitre his position before attacking it, or should you not feel sufficiently strong to warrant you in accepting battle at all times and under all circumstances should he assume the offensive, it will be necessary to increase that interval to several miles, say roundly 4 or 5 miles. The nature of the country will always be an element in calculating these intervals, for if it abounds in strong natural positions, there is less liability of the advanced guard being overpowered by an enterprising enemy before it can be supported by the main body. The state of the weather and of the roads have also more or less influence upon this point.

It is impossible to lay down rules to meet every case regarding the exact distances to be maintained between the main body and the advanced guard, and between the component parts of the latter. The general principle, however, should be that under no circumstances shall it be possible for the enemy to open an effective artillery fire upon the main body, until time has been afforded for getting its guns into position, and its infantry formed up for their protection. ❋

The order of march for advanced guards is given in the Article on "MARCHES."

With an army, all the available cavalry should be pushed out well to the front, scouting parties being still further in front of it again, by which means the enemy's doings and intentions are most easily discovered, and the army is in consequence best protected from surprise. It should be a screen covering every approach to the positions occupied by your troops, behind which you should be able to move as you pleased without the enemy's knowledge. The distance to which it can be safely pushed to the front is regulated by the same circumstances that regulate the distance between advanced guards and the army, and also by the strength of the cavalry and mounted infantry at your disposal for this most important duty; generally and roughly speaking the distance may be stated at from 5 to 15 miles. Horse Artillery should accompany a force of cavalry so employed, also some R.E. either mounted or carried in carts, their tools being on horses. The fewest possible number of wheeled conveyances ought to be with such a force, and the baggage should be reduced to a minimum, to render it as movable as possible: it must live as a rule upon the resources of the country, and no tents must be taken with it.

When the army is not covered by cavalry as above described, when on the march it must not only have its front covered by what may be called 'moving outposts,' but the flanks must above all things be protected by detached parties. The scouts and patrols sent out from the advanced parties, and the extent of front covered by them and their skirmishers should render it impossible for an enemy to be concealed in sufficient numbers near the line of march to make any serious attack upon the flanks of the army.

All ground that could afford cover to an enemy must be examined, and cavalry patrols sent to all villages near the line of march. Each patrol to be commanded by an officer, who will approach the village or houses he has been sent to examine with the greatest possible caution, sending files round both sides of it to reconnoitre it well from several positions before he enters it. He must endeavour to obtain information upon all such occasions from the respectable inhabitants.

Staff officers not required for immediate duty with the columns should accompany these patrols for the purpose of collecting information regarding the enemy.

When the front of the army is well protected from surprise by an independent body of cavalry covering its front at a distance of 5 or 10 miles from it, the advanced guard of an army corps or of a division may march as one body without any intervals between its component parts. Of course, under such circumstances it would be composed almost exclusively of infantry and artillery, which should be formed in an order of march best

suited for coming into action as quickly as possible. The object of such an advanced guard is not to protect from surprise, but to be a small, handy, compact column of all arms, stripped of all *impedimenta*, and ready to fight in any direction at a moment's notice, and to hold the enemy engaged whilst his force and position were being reconnoitred, and your main body was being deployed in its rear.

It is very advisable that a detachment of the signal corps should accompany the advanced guard, the officer or non-commissioned officer in charge of which can communicate with the signal parties sent to the high points in the neighbourhood.

All advanced parties and patrols should be instructed by the officer from whose company or squadron they have been detached, to make known the presence of the enemy to those in rear by means of some preconcerted signal, such as holding up the shako on the end of the sword or rifle, &c.

Entering a Defile or Hollow way.—The head of an advanced guard must never commit itself by entering a defile, or hollow way, without previously occupying the heights on either side by flanking parties. When the heights are thus crowned, the leading party on the road will send on a single file, which will be followed by others in succession, near enough to keep the preceding one in view, the flanking parties on the heights on either side continuing to precede the centre until the defile is passed, when they will gradually fall back to their former stations, and the whole move forward in the original formation.

The Flanks of all Objects to be turned.—Generally speaking, the flanks of every object capable of affording concealment to an enemy will invariably be turned, and the rear threatened previously to its being felt in front; by this means the enemy will be discovered, and most frequently dislodged without loss.

Ascending a Hill.—On coming to a hill the flank files will first move in both directions round the base; a leading file will then ascend, creeping up when near the top so as not to show itself upon the summit, but making its observations from behind the brow; it will then signal to the rest of the party whether the enemy is in sight or not.

Rear Guards must be considered under two aspects:—

1st. As a small guard to close in a forward movement, to pick up stragglers, and if in an enemy's country, to be sufficiently strong to prevent a few armed inhabitants or small parties of cavalry from annoying the baggage or carrying off individuals.

It should march with flankers, particularly taking care to guard the flanks of the line of baggage.

The troops composing the rear guard, even though small in number, should be commanded by an officer of rank, certainly not under that of lieutenant-colonel for an army corps.

It must on no account commence its march until all the waggons and baggage have moved off.

The baggage master or other transport officer should report to the officer commanding the rear guard when all the *impedimenta* are formed up and moving off, and such officers should be in constant communication during the march. As most of the provost establishments must be with the baggage and rear guard, the officer commanding should lend every assistance to the P.M. and his assistants, and take charge of all prisoners made by them.

As several hours will almost always elapse after the advanced guard marches before all the baggage is *en route*, the piquets which were guarding the rear during the night must remain at their posts until almost everything has moved off, when they will be withdrawn by order of the officer commanding the rear guard, and form part of it.

A staff officer should remain behind with the rear guard until it marches, to direct in the collection of the baggage, and forming it up, in accordance with the orders issued by the C. of the S. or Q.M.G. upon the subject. When all is *en route* he will gallop to the front, to report to the Q.M.G. that all is correct.

It is at times essential that a S.O. should remain with the rear guard, to assist in carrying out the orders of the officer commanding it.

No more disagreeable duty can fall to the lot of an officer or soldier than that which has been briefly described above. It is sheer hard work, without any excitement or glory. Under the most fortunate circumstances the men composing such a rear guard cannot expect to be in camp for some hours after the main body. It is most fatiguing to march in the dusty wake of an army, but it is on such occasions that officers show their true metal; any man can be cheerful and zealous with an advanced guard, or even with a rear guard during a retreat, but it is only those who have the keenest professional feelings who can throw all their energies into every little duty, irrespective of its being agreeable or otherwise.

Unlike all other duties, it is advisable that whole battalions should seldom be employed upon a rear guard of this nature. It should be formed of companies from several regiments, their cooks, and a few men to help them, being sent on with the main body; by this plan the men composing it will find upon arriving in camp everything ready for them, their rations drawn, if not cooked, &c., &c., and they should never, except in extreme cases, be employed for the rest of that day upon fatigues.

It would be well to punish irregularities on the part of officers while thus employed, by ordering them again on a similar duty, if necessary, without their own men.

THE SECOND CONDITION under which a rear guard has to be considered

is that when it is acting between the advanced guard of the enemy and its own army. Circumstances, such as want of provisions, political combinations, &c., may require an army to change its position, sometimes even its base and line of operations, or it may be necessary, to cover the retreat of an army during a retrograde movement, made in order to take up a position in rear, like that made by the English on Quatre Bras, and the Prussian force under Ziethen on Charleroi in 1815: or when covering the retreat of a beaten army.

The great object to be attained is to retard the enemy, which, with a well-disciplined army that has not yet engaged—as, for instance, the allies previous to Waterloo—is comparatively easy, but with a beaten and perhaps a demoralised army, is the most trying of all operations. The officer commanding such a rear guard should be the best in the army; it may not be necessary that he should be so *rusé* as the commander of an advanced guard, but he must be one for whom danger has at least no horrors: he must possess dogged determination, courage of the highest order, and untiring energy. Feeling the responsibility of his position, he must be at all times prepared to sacrifice himself and those under him to the necessity of the time, and for the safety of the army which he is protecting.

Rear guards have not the same necessity to reconnoitre the ground to be passed over as advanced guards have, for the army having already marched over it, prevents the possibility of an enemy being concealed there.

A rear guard of this nature must have no *impedimenta*. Indeed, officers should be without baggage altogether whilst so employed; all baggage should be sent to the front, to march with that of the reserve.

Its wounded should be forwarded daily as far to the front as possible. It may even sometimes be necessary to leave its wounded behind: in such cases a medical officer should always be left with them; he should be left supplied with money and with medicines if they can be spared.

Rear guards told off to cover the retreat of a beaten army should be formed from the reserves, or at least from the freshest troops: their strength should be one-fourth or one-fifth of the whole force. If the road by which the retreat takes place is not well known to the officer commanding the rear guard, experienced S.O.s should be told off specially to reconnoitre the road a day's march ahead of the rear guard: they must of course act in concert, under one as the head, who will send back reports constantly as to the condition of the road, its bridges, the streams and villages to be passed, &c.; every position suitable for the rear guard to defend itself in to be especially noted, and a rough sketch supplied of its features. If this most important of duties is ably performed, it will render the commandant's duties much lighter, and tend above all things towards the main object in view—that of retarding the enemy, so as to afford the army time to retreat unmolested in an orderly manner.

The nature of the country must affect its manœuvres and composition. In an open country all the available cavalry and mounted infantry, if there is any, should be with it, for the pursuing enemy's advance is sure to be chiefly formed of mounted men. Under all circumstances, however, it should have some of the best infantry with it, for all countries, where armies can operate, must have rivers, streams, or watercourses of some description, and such generally afford positions where infantry can make an effective stand; the pursuing cavalry being arrested, they have to wait for their infantry. If the position occupied by the rear guard is in an intersected country, the enemy will have to reconnoitre it and form up his troops for attack: perhaps deployment may be necessary. All this takes time, and worries pursuing troops beyond description, when it is constantly repeated with the same result, viz., when completed having only the satisfaction of seeing the rear guard march off under a cloud of skirmishers.

To conduct such manœuvres properly requires the coolest head, endowed with great judgment. No man who has not had some experience of war can command a rear guard efficiently; without it he is apt to relinquish his vantage ground too soon, or remain there too long—both serious errors, the last a fatal one. His watch must be his guide in a great measure, unless he has a clear view of the enemy's movements. His flanks will always be his weakness, particularly if there are one or two other roads running in the same direction as that by which he is marching. If so, they must be provided also with rear guards, the relative strength of each to be dependent on their distance from the main road, and upon the manner in which the pursuit is conducted. If at any time the enemy concentrates and attacks one of these secondary rear guards in force, it must be at once supported from the main body of the army, and the attacking party driven back at all hazards.

The fact of there being several parallel roads cuts both ways; for if it gives the pursuers opportunities for outflanking the rear guard, it also facilitates the retreat immensely, the balance of advantage being greatly in favour of the latter.

The great art of rear guards is that of being able constantly, without risk, and with but little trouble, to force an enemy to deploy for attack, and then to get safely away yourself without any serious fighting; in other words, the rear guard should, by frequent occupation of strong positions, be continually threatening to fight, as it is by so doing, and not by actual conflict, that it best fulfils its purpose.

In a long retreat, when this course has been followed for a number of successive days, the general commanding the pursuit is apt to become reckless, and, neglecting to take all necessary precautions, may push on to attack with an insufficient force at hand, or in an irregular manner: it will then be for the rear guard to pounce suddenly upon him, with all his avail-

able force, and having struck him a severe blow, at once resume the retreat. The officer commanding must not allow himself to be carried away by any partial success of this nature so as to forget his primary duty, for he should bear in mind that he cannot stop, except to retard the pursuit, and that every succeeding quarter of an hour brings his enemy reinforcements. The length of time that a rear guard can remain with safety in a position depends on its intrinsic strength, and the obstacles in the way of an enemy's turning it.

The distance that a rear guard should be from the main body depends upon the nature of the country, its numbers, and the manner in which the pursuit is conducted. If the pursuit is slack, and the rear guard is composed of an infantry division and a suitable proportion of cavalry, it can safely be a march in rear. Under all circumstances, however, constant communication should be maintained between it and the main body.

In the absence of a regular force of mounted infantry, if a few hundred infantry, selected for being good shots, can be mounted, they will be found invaluable with a rear guard; working with the cavalry, they will enable a position to be held after the infantry have retreated. When seriously pressed, the horse artillery can limber up, and go off at the trot until it reaches the main body of the infantry, when these mounted infantry and cavalry skirmishing on foot, might run back to their horses, mount, and be off at the trot or gallop. The manœuvres of a rear guard should be performed as much as possible in échelon, each échelon supporting the other, and retiring alternately when pressed.

The actual rear of the rear guard should be a line of skirmishers, as far as the nature of the country will admit of it, the three arms being used according as the ground is suited to them.

It is not necessary to have any large reserves of ammunition with the rear guard, as the main body can drop daily all that may be required, and the fewer waggons, the easier will be the work of the rear guard.

An army of 2 army corps and a reserve brigade of cavalry retreating by three roads about 2 or 3 miles apart, with a rear guard of 1 division and 2 brigades of cavalry, and a reserve Battery R.A., would be disposed upon the three roads, as shown in Fig. 23, if the ground traversed by each road was of the same general nature and tolerably open; in this sketch the supporting parties of cavalry are not shown, neither are the numerous flanking parties.

In retreating over a bridge that it is intended to blow up, arrangements must be made that the fuse or saucisson that is to fire the charge cannot be got hold of by a sudden rush of the enemy. When all the troops have passed the bridge to be destroyed, all the disposable guns should be in battery, so that the ground immediately in front of it may be well swept by a heavy fire.

If hardly pressed, and the country is so inclosed that artillery and masses of troops can only move upon the roads, to set fire to a village after your artillery has got safely through is a good means of retarding the enemy.

Care must be taken to burn and destroy all provisions, standing corn, &c. —in fact, everything that would serve as supplies for the pursuing enemy. His great difficulty will be to feed his army when moving rapidly away from his base; so everything that tends to increase that difficulty should be attended to.

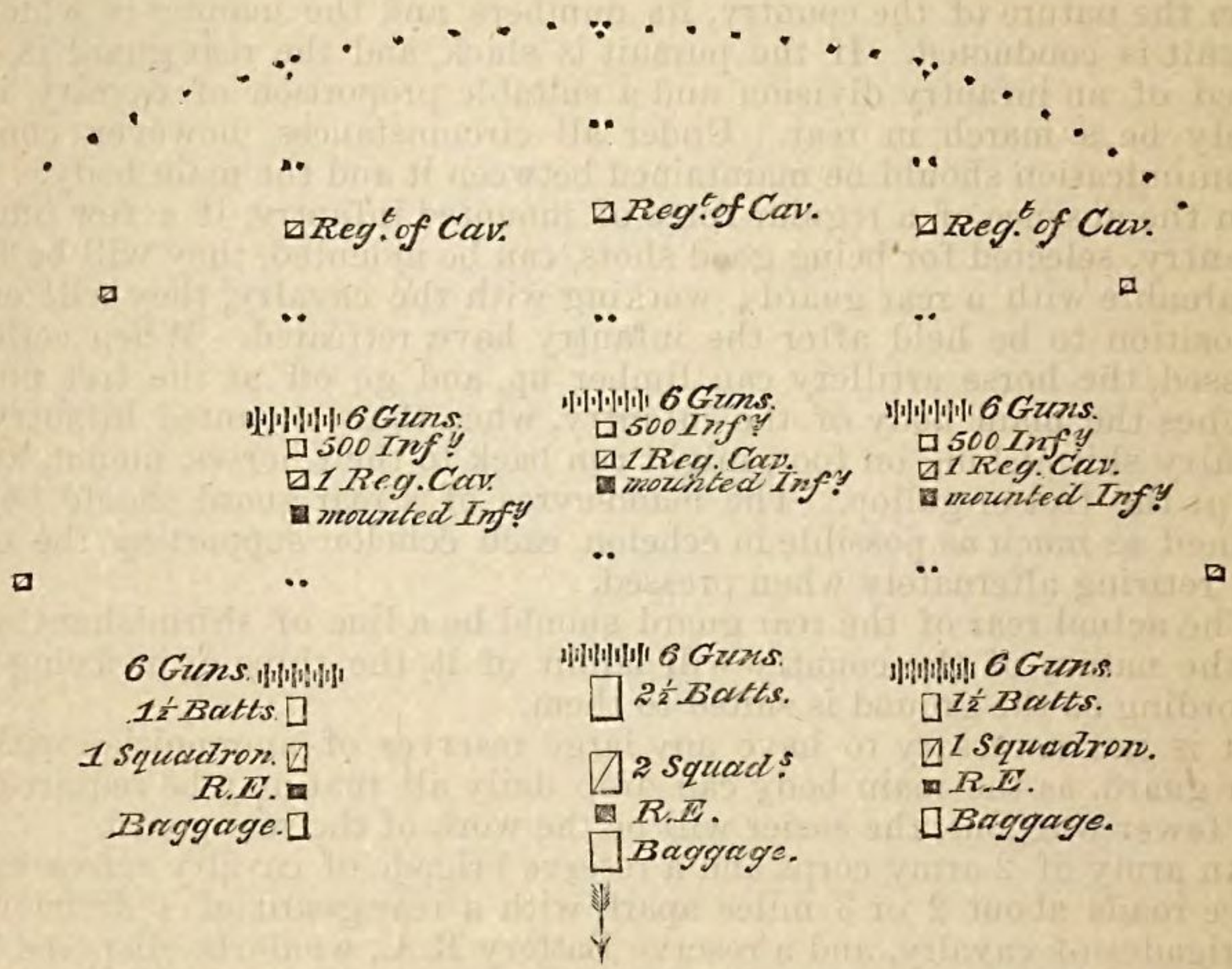


Fig. 23.

To retreat through a defile with a beaten army must be annihilation, if your enemy understands war; but if the main body succeeds in getting through it before the rear guard has been overpowered, much time can be gained for the general retreat by an obstinate contest at both extremities of the defile as well as in it. The nature and length of the defile must determine the movements to be made; but provided that the heights on both sides have been well crowned by troops from the main body, for which there will be ample time prior to the arrival of the rear guard, the

enemy ought to pay dear before his army can form up beyond the defile. It is a vulgar error to suppose that the most determined stand should be made on the near side of defiles; the entrance to them should without doubt be disputed, and the troops employed in defence should not be withdrawn until the enemy had deployed in force, and begun to scale the heights on either flank; of course the artillery should go first; having fired their last shot, the guns (to be the lightest of the army) will limber up and gallop off, their waggons having left previously. A strong line of infantry skirmishers to be well posted on the heights on both sides. The main body will then move off, followed by the supports. If possible the last line of skirmishers should be furnished by mounted infantry or good dragoons. When the supports had reached the entrance to the defile, these skirmishers should mount and gallop to the rear; they will soon be safe from the swiftest cavalry, for once past the line of infantry skirmishers posted along the flanks of the defile, the fire from these last will soon check pursuit. If the ground is well disputed in the defile itself, the general in command will be enabled to organise a small line of battle at the far side, with batteries arranged to enfilade the defile, and cavalry ready to charge those first debouching from it: advantage being taken of the ground, the enemy's advance ought to be retarded a long time, and he should have to pay dearly for his success, before he succeeds in drawing up his army on the plain beyond.

Pursuits.—You have won a great battle, and the enemy are in full retreat; run after him; hammer him with guns, charge him with cavalry, above all things pass round his flanks, and keep pushing him and hitting him from morning until night. His forces will soon cease to be an army. The French, after Waterloo, when well beaten by the English, and pursued without intermission by the Prussians, flocked back across their frontier a disorganised mass without arms.

The general who, in pursuit, acts with precaution, who manœuvres instead of charging, will never inflict much harm upon an enemy; caution is out of place when you have a beaten army before you. This conduct, which by some may be termed reckless, may at times occasion losses to the pursuer, but unless it is practised, you can never expect to crush a retreating enemy. Then is the time for cavalry and mounted infantry, if you have any of the latter.

As soon as it is perceived by a general during an action that his enemy shows signs of exhaustion, arrangements must be at once made to have everything ready for pursuit whenever he begins to retreat.

The Q.M.G. or C. of the S. will detail the troops to take each road, and intimate to the generals who are to command the several columns, their order of march, &c.

The enemy will, of course, endeavour to cover his retreat by all his freshest troops, with whom he may even, perhaps, make an offensive movement. Then is the moment for reserves to be launched out upon him to crush him; the whole of the army should go in straight at his rear guard by front and flanks; with his main body formed up in columns of route, and considerable portions of it already well in retreat, everything is in your favour, and no such opportunity can be expected to offer itself again. Whenever subsequently, during the pursuit, you come upon the enemy's rear guard formed up, you will be in column of route yourself, and by the time you have deployed and are ready to attack, he has again moved off; whereas at the end of an action you are deployed and formed in order of battle. No effort should be spared then to take advantage of one's position. In all our battles against Napoleon's troops, and lately against the Russians, we have shown ourselves incapable of reaping the benefit of victory. Wellington won many battles, but never delivered any very crushing blow to his opponent, *because he never pursued.* Waterloo is no exception, for the pursuit was effected by the Prussians.

Of course the C. of the S. will know all about the roads by which the enemy can retreat; he must select that by which to send the main body: the great object to be obtained is to get rapidly along with your cavalry or mounted infantry and H.A. in the same direction as the enemy, with the least possible resistance, in order to fall upon the flank of his main body and retard it, so that your infantry following him up behind, can fall upon it.

The manner in which General Sheridan pursued the Southern army in its retreat, with what was called cavalry in America, but what was, in reality, only mounted infantry, and forced it to surrender, should be carefully studied.

Pursue with your main body upon the largest possible front, and whenever you know that the enemy has to pass through defiles, such as bridges or towns, spare no trouble to press him hard.

Alas for the army that has no cavalry, or is very weak in that arm! Its pursuing power is small.

Every available quadruped should be pressed into the service for the purpose of carrying infantry in pursuit; everything should be made to give way to furthering it. A battle cannot be won every day, and the general who, having won one, fails to reap all due advantages from it because he has wounded to look after, or because his men are tired, should never be employed again.

The staff have a busy time in pursuits, for the great difficulty is to feed your army. Of course the enemy will burn and destroy all supplies that he leaves behind him, and every day takes the pursuers farther away from their base of supplies. In Europe, in future, there will be generally rail-

roads running parallel with all lines of operations, so that a pursuing force can be fed by them.

Marshal Saxe says of a general sent in pursuit of a beaten army, 'Il faut poursuivre sans cesse, toutes les manœuvres sont bonnes alors; il n'y a que les sages qui ne valent rien.'

A pursuing army must bivouac, no matter what the weather may be.

Retreats.—The retreat of one army before another will be considered under two heads:—

1st. As merely a change of position to the rear, effected by one or two armies facing each other, and in close proximity.

2nd. The retreat of a beaten army closely pursued.

The Articles on this subject, and on "PURSUITS," apply both to armies and small detachments.

1st. An army in presence of another, wishing to retreat, should, above all things, endeavour to conceal its intention from the enemy. To do so efficaciously, a general should begin by concealing it from his own troops.

The egress of all country people from your lines should be stopped.

The inventive genius of a general is displayed upon such occasions. An English general of the present day is in the most unfortunate position in this respect, being surrounded by newspaper correspondents, who, pandering to the public craze for 'news,' render concealment most difficult. However, the post and telegraph will always be in the general's hands, so he can lay an embargo on the mails whenever he wishes it, without its being known for a long time; or he can, by spreading false news among the gentlemen of the press, use them as a medium by which to deceive an enemy.

There have been many instances of an army getting clear away from the presence of another without its being discovered for a day or two.

The general should take the smallest possible number of his staff and heads of departments into his confidence. The C. of the S. will make all the necessary arrangements, and have instructions for each general officer who is to command a column written out, stating the number of columns in which the army is to retreat, the roads by which each is to march, the exact time at which they are to be at certain places, &c. Means must be taken to prevent all communication between the outposts and the main body, and for having it spread abroad among the latter that the enemy has retreated.

The parks of stores and provisions in rear should commence moving about sundown: the baggage should be collected a couple of hours afterwards and commence its retrograde movement. Rumour should always say, 'upon the best authority,' that this is being done to allow greater

freedom in pursuing the enemy, &c., or that they are only being sent a mile to the rear, where they are to halt until the army moves off, when they will follow it. Much will depend upon the state of the roads, their number, the general topography of the country, the season of the year, and the age of the moon, as to the hour when the troops should begin their march.

If possible, it is better that they should move about a couple of hours before daybreak; they will then have got sufficiently to the rear before it is light, so that the dust occasioned by their march may not be visible from the enemy's position.

It will be for the general commanding the rear guard to play the game of brag as long as he can.

He should always have everything ready for his march, so that if attacked in force he may retire fighting in good order. His weakly men should have been sent to the rear with the main body of the army.

If unmolested, he will begin his retreat early, leaving only cavalry outposts in front of the enemy. If he has any mounted infantry, they should take the place of all infantry piquets.

These outposts should not retire until forced to do so.

The cavalry and mounted infantry outposts, aided by a few guns, and by a force of cavalry if the ground is open, can then retire slowly before the enemy.

Whenever a force of any description or strength is stationary for more than a day, its Q.M.G. or C. of the S. should put on paper the arrangements for its retreat, and write out in his memorandum book the orders to be given to each officer commanding a column, so that if sent for in the middle of the night by his general, and told to arrange for a retreat in the morning, he should have little to do but assemble the generals of divisions, or brigades, or commanding officers, according to the composition of the force, and read over to them the orders for the movement, entering into verbal explanations of anything that they did not clearly understand. It is most necessary that as many divisional S.O.s and B.M.s as possible should be present.

The staff arrangements should indicate exactly the rendezvous for each column, naming for this purpose some well known natural feature, or such and such a mill, church, cross-roads, &c. The time and order for the withdrawal of the outposts to be clearly stated and explained to the F.O. for the day, or whatever officer is in charge of them. In retreats of this kind, everything depends upon the order and silence with which they are executed; and that such are attended to, depends upon the manner in which the staff duties are carried out.

2nd. *The most difficult of all military operations is the retreat of a defeated army before a pursuing enemy.* The only hope of safety lies in the

conduct of the officers and men who form the rear guard. Their duties have been already considered.

When, during an action, a general in command imagines that things are going against him, he should at once direct his Q.M.G., or C. of the S., to make the preliminary arrangements for a retreat. This must be done most quietly, alleging any motive but the real one for the movements executed. The first thing is to get away the baggage, sick, wounded, and reserve supplies, &c. They should be despatched at once to the rear, by as many roads as possible, each column having its own orders.

It is taken for granted that they have been started off a good hour at least before the actual moment arrives for a retreat of the army. Before then, it is to be hoped that the force destined to be the rear guard may be already in the nearest defensible position suitable for it that is to be found in rear, the artillery belonging to it retaining only one line of waggons, sending the other to the rear.

The peculiar circumstances of the engagement must determine the order in which the several divisions will retire. The movement to be more or less in échelon. It may sometimes be necessary to cover the first movement to be made by a general or partial attack, or by a cavalry charge.

If the ground is so open that batteries can retire anywhere over it, all the available artillery must open fire protected by all the cavalry. When obliged to fall back, every alternate battery should limber up, and trot 400 or 500 yards to the rear and then come into action, those in rear limbering up in their turn and trotting the same distance to the rear of those who had previously retreated and formed up, and so on. As soon as the rear guard can get away from the gripe of the enemy's infantry, it is all tolerably safe, for its own cavalry and artillery, assisted by infantry as required, can make a good fight against the two former without infantry, as the enemy must break up his force into columns to follow with any speed. Strong lines of skirmishers should be formed in rear, through which the columns will pass : these, aided by strong batteries, placed on all the commanding ground, will generally suffice to hold an enemy in check for some time. No opportunity should be lost whereby his advance can be checked. Villages that lie on his road must be set on fire, bridges destroyed, &c. A tree felled across a roadway may check an advance for five minutes, and five minutes under such circumstances may be worth millions of pounds to the nation concerned.

During a retreat, the troops must always bivouac.

The arrangements for blowing up bridges should be made by the main body, for if left for the rear guard to do, there may not be time for it to do the work efficaciously.

It does not follow that if the staff is good, the retreat of a beaten army will always be carried out successfully, but it is certain that it must

quickly degenerate into a disorderly flight, unless the staff is of the first order.

Positions.—Having given in detail the principal sanitary considerations which should weigh with an officer in selecting positions for encampments or for the occupation of troops for purposes of defence, &c., the military considerations may now be dwelt upon.

An officer is either sent to examine certain positions, or else to find positions suitable for a force of a certain strength.

One frequently comes upon positions which, to the uninitiated, appear of great strength from their inaccessibility, &c., which are at once condemned as useless by the experienced S.O., owing to the absence of wood and water (they being of first importance in all positions), or from some other serious defect in them.

Every position should afford a depth of five or six hundred yards upon which all arms can manœuvre.

Free communication from right to left, and from front to rear, are essential; positions cut up transversely by deep gullies, rivers, or other obstacles, are objectionable. Good roads in rear, to retreat by in case of necessity, the more the better, are essential; without them no general should take his troops into action.

A front of fortification after Vauban, before he gave such prominence and development to the ravelin, is an exemplification of what a position should be. It should be a series of curtains flanked by strong projecting natural bastions. In the first case an officer has to consider the number and description of troops the position is calculated to hold to advantage; as a rough calculation it may be taken as 1000 men to every 150 yards for small positions.

This is calculated for two lines and for a force with an ordinary proportion of guns. It is, however, greatly dependent upon circumstances, for the different parts of a position require to be held in different strength: for instance, steep places that cannot well be attacked, and open glacis-like ground, forming as it were the curtain to bastions situated on either flank, by the fire from which it is well swept, require but few defenders, whereas ground easy of access, particularly when it forms if not the key, at least an important tactical point, requires to be occupied in force. For extensive positions, allowing for a reserve of about $\frac{1}{5}$th of the force, from 6000 to 8000 men will be required for every 1000 yards of open ground, calculating for an army with about $\frac{1}{6}$th of its whole force as cavalry.* In the second case, he has to find a position suited to the development of the force for which he is seeking it, attention being paid to the peculiarity of its com-

* *At Waterloo the English and French had both over* 12,000 *men to the* 1000 *yards, and at Gravelotte the proportion was still greater.*

position, so that it be favourable for the action of the arm which is in preponderance: each arm should be placed so as to afford mutual support. A position that is admirable for 20,000 might be an absurd one for half or double that number. One that is good for infantry and artillery alone, might be useless if there is also a proportion of cavalry, and so on. For an army of two army corps and a reserve brigade of cavalry, a front would be required of about 5000 to 8000 yards, according to the natural strength of the ground, for the stronger it is, the more extended may be the front occupied.

To find the number of infantry deployed in two lines that will fit into a given number of yards, multiply that number by 6; for paces multiply by 5. This makes no allowance for skirmishers in front, or for reserves. A deduction of 10 per cent. should be allowed for intervals; as however it is very seldom that infantry will be in action without guns, it may be taken for granted that the infantry removed from the lines to make room for the batteries, will be ample for skirmishers and a small reserve. The numbers already given, viz. 1000 yards for every 6000 or 8000 of all arms, will generally be a fair calculation, allowing for a reserve, &c.

Cavalry in one line requires one yard to each file, with intervals of about 12 yards between squadrons.

Artillery in line requires 95 yards to each field, or H.A. battery, with intervals of 19 yards between each, or between them and other troops.

The frontage required by infantry is 2 ft. per file, with intervals of 30 paces between battalions.

Infantry can take up a position anywhere, and its fire will always be effective; posts scarped towards the front capable of holding 100 or even 50 men, and having a great command, may sometimes be of material advantage during an action, particularly if they are about 100 yards in advance of the general front; as an advancing enemy, not liking to have such on his flank, will try to take them, and will lose men accordingly. For the general line of infantry, however, it is advisable that the ground be such as to enable them to assume the offensive at any moment, the slope not being greater than 10°: the position at the Alma occupied by the Russian infantry, in the vicinity of the battery stormed by the light division, was nearly perfect, as it resembled a glacis with a serious obstacle below it, which destroyed all formation in crossing. If the Russians had been strong enough to have assumed the offensive, and charged down the hill upon our men when they were broken and mixed up together, the result might have been serious.

For artillery the first requisite is that the ground be hard and firm, with a slope of not more than 4°; it is advisable to post it so that the limbers and waggon should be near at hand and yet protected from fire.

For cavalry, firm open ground devoid of ditches or fences is the best.

Cavalry cannot charge down hill effectively at a slope greater than 5°.

Positions are of two kinds :—

1st. Those where it is intended to accept a decisive battle, and

2nd. Those which it is only intended to hold for a short period, until your own forces have had time to concentrate, or until you have forced the enemy to concentrate all his forces to attack you ; or, for merely checking the enemy, as would be the case with strong rear guards in retreats.

Waterloo and Talavera are specimens of the former, Quatre Bras and Busaco of the latter. Elevated ground in some part of the position is most useful for enabling you to perceive the enemy's movements to a considerable distance : positions where this power is afforded to the enemy are objectionable. It is of the utmost advantage that the ground should so dip, immediately in rear of the position, that the 2nd line and reserve can be kept out of view and protected from fire : this will also enable troops to be moved from one flank to the other without the enemy's knowledge, which is of the greatest consequence, if it is intended at any moment to assume the offensive : for by it a large force might be massed upon one flank ready to pour down upon the enemy, when by a series of false attacks made upon the other he had been induced to strengthen it to the disadvantage of the wing about to be seriously engaged.

The protection of the flanks is a serious consideration ; one at least ought to rest upon some impassable obstacle, such as a deep marsh or river, or chain of inaccessible mountains, &c. Villages built of mud, such as there are in India, which cannot be burnt, or even large farmhouses, may be made strong points upon a flank, if properly fortified and held.

It is seldom that one finds a position of more than a mile in extent in a straight line ; there are sure to be salient points in it, that is, portions of the ground jutting out towards the enemy like bastions. If these are strong by nature, or easily capable of being strengthened by art, they add immensely to the strength of a position, as they must be attacked and taken before the main line, forming the curtains as it were to such, can be approached. Villages and farmhouses somewhat in advance of the line answer the same purpose—La Haie-Sainte and Hougoumont at Waterloo, for instance.

The general form of positions will either curve convexly or concavely towards the enemy, or be a mixture of both.

For purposes of defence, if the flanks are strong and cannot easily be approached or turned, the concave is the strongest, as an attacking enemy must, in moving towards you, expose both his flanks to a pounding from the artillery safely posted with your advanced flanks.

If, on the contrary, the spots where your flanks rest present no feature of strength, and can be easily turned, it is better to have them somewhat retired, thus forming a convex front towards the enemy.

This will secure to you the advantage of short lines of communication,

so that if a wing requires support, the reinforcement has only a comparatively short distance to go from the reserve.

An obstacle, not actually an impassable one, running somewhat parallel to the general form of the position, and about two or three hundred yards in front of it, adds greatly to its strength. It breaks the enemy's formation in advancing, and consequently throws him more or less into disorder, affording you opportunities for assuming the offensive by charging him in front with the bayonet, or in flank with cavalry. It must be remembered that all such obstacles as high banks, hedges, and deep gullies running parallel to your front that afford cover to an assailant, are most dangerous ; if they cannot be avoided, care should be taken that a raking fire of artillery is brought to bear upon them, or else they must be cut away, so as to be seen into by infantry fire. The river at Alma broke up our force dreadfully when crossing in line, but the high bank which screened us on the Russian side enabled the line to re-form whilst sheltered from fire.

Obstacles that cut up one's own line, are above all things to be avoided ; but those that are perpendicular to the front, and cease at our first line or within 100 yards in front of it, strengthen the position by cutting up the assailants into distinct bodies incapable of mutual support : a counter attack under such circumstances has everything in its favour.

Positions with wooded ground in front of them, under cover of which the enemy can form his columns of attack, should always be avoided. The same remark applies to high ground, the reverse slopes of which cannot be observed.

Beresford very nearly lost the battle of Albuera from having a hill to his right front, behind which Soult massed his column of attack without being perceived. Positions should be as nearly as possible at right angles to the general line of retreat, which should cover that line well.

If there is but one road to retreat by, it should run from nearly the centre of the position.

Positions are consequently to be looked for on lines of communication where they are crossed at right angles by small streams or low lines of hills. A very common locality for them is with the front along a stream, which runs into a large unfordable river or into the sea, upon which one of the flanks rests. Such were the positions at the battles of Prague and Alma.

It must be remembered that no position is worth much for an army unless it affords the power of assuming the offensive at all periods of a battle.

GRADATIONS ADMITTING OF MANŒUVRES (M. LEHMON).

5°	10°	15°
Infantry. May move with order, and has down hill the most effectual fire and charge. *Cavalry.* May move with order, and charge effectively either up or down hill. *Artillery.* Has a more effectual fire down than up hill.	*Infantry.* Its close movements become more difficult. *Cavalry.* Can only canter down hill: the charge possible only up hill. *Artillery.* Moves with difficulty; its effectual and constant fire ceases.	*Infantry.* Cannot move any considerable distance with order: their fire up hill without effect. *Cavalry.* May still trot up and walk down hill. *Artillery.* Moves with great difficulty: its fire totally ceases.

GRADATIONS THAT MAY BE ASCENDED AND DESCENDED SINGLY.

20°	25°	30°
Infantry. Cannot move in order, and can fire only singly with effect. *Cavalry.* May still ascend at a walk, and descend without order, and that only obliquely.	*Light Infantry as before.* Light cavalry may ascend one by one obliquely, and descend in the same way, but with much difficulty.	*Light Infantry as before.* Light cavalry may ascend obliquely, but with great difficulty, and when the slope is of soft earth.

Occupation of a Selected Position.—We shall now suppose that a good position for an army of 2 Army Corps and a Reserve Brigade of Cavalry, of about 8000 yards in extent, has been found by the staff officer sent out for the purpose, and that the Commander-in-Chief intends to accept battle there.

It may be advisable to march there at once and await the arrival of the

enemy, or it may be intended to await a further development of his plans before doing so. In either case the most careful plans should be made of it and its approaches, and the exact place for every brigade decided on. Rough pen-and-ink sketches should be prepared for distribution to the generals commanding divisions when about to occupy the ground.*

In the event of occupying it some time previous to being attacked, it is advisable that the camp should be formed some two or three miles in front of where the battle is to be accepted; somewhat nearer, if it is determined to strengthen it to any great extent by field-works, for which large working parties would be required.

It may be presumed that the army taking up a defensive position is the weaker side. All the available cavalry and mounted infantry should be kept between the main body and the enemy some five or six miles, or perhaps a good day's march in advance. Its duties should be those of an advanced guard; to retard and annoy the enemy in every way, breaking up roads and bridges, and keeping the C. in C. constantly informed of all the enemy's movements, &c.

The disposition of troops shown in plan on next page gives generally a rough idea of how an army corps in an open plain, without any natural supports whatever for any part of the line, should be formed up either for attack or defence.

It is not likely that an army would ever halt to fight in exactly such a formation, as it is needless to add that the distribution of the three arms must entirely depend on the nature of the ground, and its adaptability for the movements of each.

Infantry should never be posted in rear of guns that are in action. In undulating ground a succession of ridges, like so many waves of the sea, are frequently to be met with. These are of incalculable advantage by giving you command for your artillery fire, whilst behind them the infantry not actually engaged at the moment can lie down under cover, and your reserves, field hospitals, &c., may remain hidden: it is very essential in defensive positions that your guns placed in rear of your first line should be able to fire over it.

The enemy will naturally try to begin his attack upon your position by a heavy artillery fire: your previous study of the ground should enable you to foresee where he will place his batteries, so all your arrangements should be made with a view to overwhelming his artillery with musketry or artillery fire—with both if it is possible—whilst he is in the act of unlimbering. You know the range, and it will take him some time to ascertain it: hence your opportunity.

* The larger the scale upon which these plans and sketches are done the better: it should not be less than four inches to the mile.

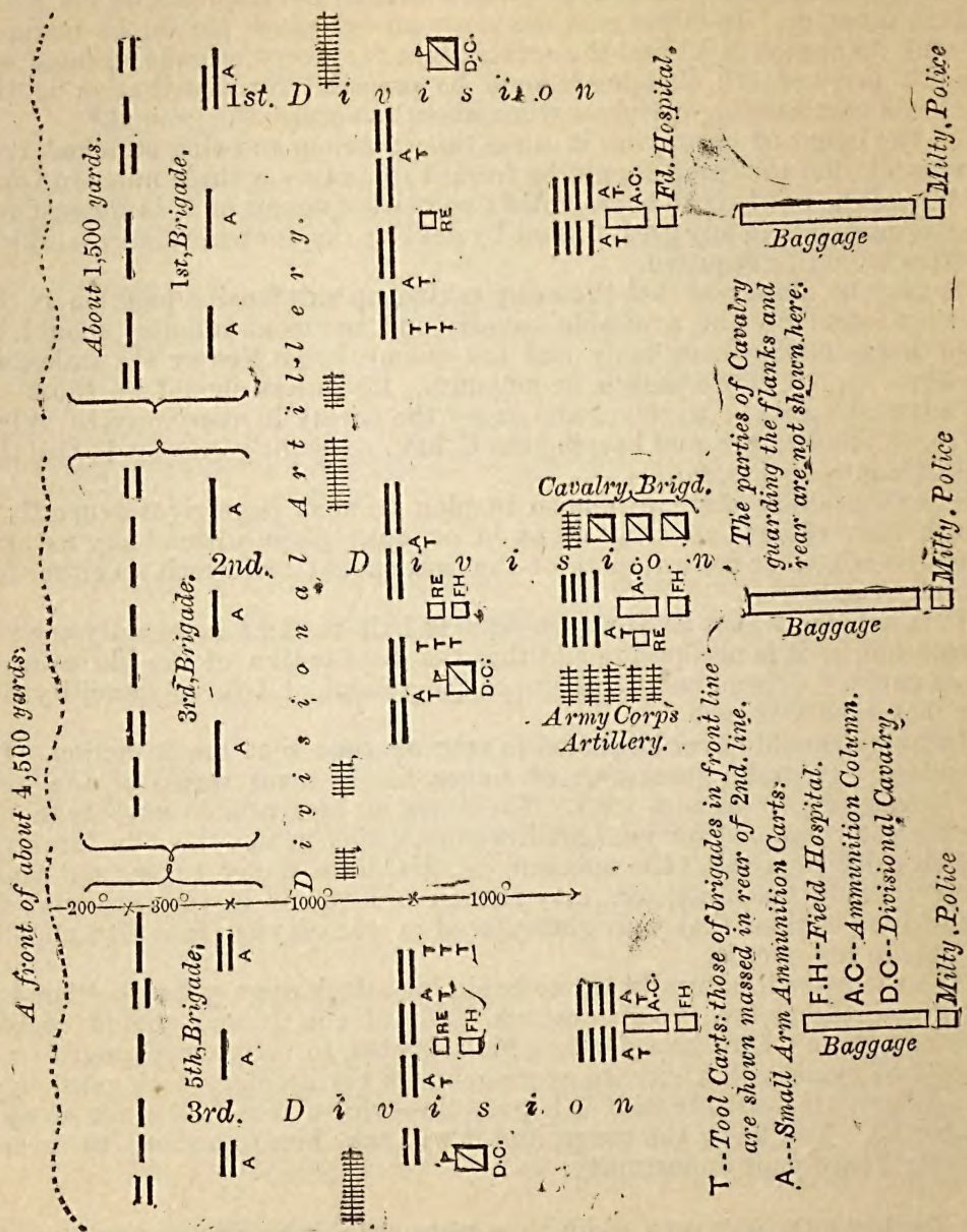

A front of about 4,500 yards.
About 1,500 yards.
1st. Division
1st, Brigade.
2nd. Division
3rd, Brigade.
Artillery.
Cavalry Brigd.
Army Corps Artillery.
Fd. Hospital.
Milty. Police
Baggage
The parties of Cavalry guarding the flanks and rear are not shown here.
Milty. Police
Baggage
Milty. Police
200
300
1000
1000
5th, Brigade.
3rd. Division
T.--Tool Carts: those of brigades in front line are shown massed in rear of 2nd. line.
A.--Small Arm Ammunition Carts:
F.H--Field Hospital.
A.C--Ammunition Column.
D.C--Divisional Cavalry.

Fig. 24.

Your plans should be devised with a view to forcing the enemy to divide his forces, so that you, perchance, acting upon interior lines, should by means of skilful combinations meet him everywhere with at least equal strength, whilst upon decisive points your force should be preponderating. To do so effectively, you must occupy some portions of your defensive position with a small force, using the pick and shovel to counteract your numerical weakness. Where the steepness or marshiness of the ground render it difficult of access, a line of skirmishers may be sufficient to hold it. No direct attack, no matter what may be its strength, should ever succeed in turning a line of infantry out of a shelter trench in front of which there was no cover within about 300 yards of it.

No scheme for the occupation of a defensive position can be good when provision is not made for counter-attacks at some points of the line: it requires true military genius to decide properly the when and the where. It often happens that even an ill-planned, ill-timed, offensive return by a flanking movement is of great service if conducted vigorously, for it seldom fails to embarrass an attacking enemy.

As a rule, you may generally expect the most serious attack will be made upon one or other of your flanks. The nature of your position, the approaches to it, the distribution of the enemy's army in the theatre of war, and a knowledge of the objective point that your adversary wishes to secure, will generally enable you to determine with tolerable accuracy upon which flank that attack will be made.

Under all circumstances the flanks of the position should be protected from surprise by cavalry detached according to the direction of the roads and configuration of the country. It should be well to the front, and cover the utmost extent of ground with its patrols, always careful to keep up communication with the main body, and prepared at any moment to advance upon the enemy's flank and harass it in the event of success, or to hang upon his flank and retard him in case of a general retreat being necessary.

The greatest possible extent of ground to the right and left of the position must be carefully watched by your cavalry to warn you of, if not to prevent, any endeavours on the enemy's part to overlap or turn your flank.

The arrangements for the defence of positions has not undergone great radical changes in the way that those required for offensive tactics have done.

If one of your flanks rests upon no strong ground, and is therefore the one most likely to be selected by the enemy as his point of attack, one of the best methods for securing it is by posting a brigade or division in direct echelon, say about half a mile to its rear; thus posted, it can fall upon the flank of the enemy's troops attacking the exposed flank, who, assailed in front and flank, should be made to suffer very severely. If you have

mounted infantry, a large proportion of it should be with this retired echelon. The bulk of your reserves in defensive positions should be in rear of one or both flanks.

If in the ground taken up as a defensive position there are any impassable obstacles, or any that are very difficult to pass, such as a small stream, deeply-scarped ground, or a marsh running nearly parallel to your front, your guns of position should be placed behind them. They cannot be got at by the enemy, so they do not require any troops to be specially told off to take care of them, and the enemy's fire, if the least short, plunges harmlessly into such obstacles.

The localities and circumstances can alone determine the position to be occupied by the *impedimenta*. The carts, waggons, &c., should be parked, or kept in column of route on the roads some 4 or 5 miles in rear, the horses hooked-to, and ready to move in advance or in retreat at a moment's notice. The officers of the A.S.C., together with the police and the provost establishments, must be responsible for their order, and above all things guard against individuals straggling away from the main body. Purely military stores should always be parked separately.

It must be an understood thing that the baggage is never parked, so that in the event of a retreat it has to begin its retrograde movement by marching through a village, crossing a bridge, passing along a narrow causeway, or other defile. Plenty of wide openings should be made from fields where baggage, &c., is parked, leading out clear to the main roads, by which an advance or retreat must be made.

The commander must determine which are the important parts—the keys, as they may well be called—of the position; such parts must be occupied in force. A commander should for the moment imagine himself in the enemy's place, and arrange in his own mind what he would do, if it were his luck to be the assailant instead of the defendant; reflections of this nature will cause him to realise his weak and his strong points, and enable him to make his arrangements accordingly. He should then set to work to strengthen himself artificially. A few hours' work bestowed on a village or on a substantial farmhouse may turn the scale in your favour. If time permits, parapets to screen the gunners, at least, from musketry fire, should be thrown up.

The garrisons of all such villages or houses must be fixed according to the extent of walls, hedges, &c., to be defended; it is a mistake to put large numbers into such places, for they are certain to be well pounded by artillery—a strong garrison would only greatly increase the losses, without adding much to their strength. Locking up, as it were, large bodies of men in such posts is most dangerous, for if the line is forced to retreat, they must inevitably be taken, as occurred at Blenheim.

The real strength of all fortified posts in front or on the flanks of positions

depends upon the flanking fire brought to bear upon them from the main line, and upon the facility of supporting them when hardly pressed.

When such posts are in front, it is essential that supports should easily reach them, the more under cover, and out of view of the enemy, the better.

Posts of this nature add immensely to the strength of a position, but as the enemy must take them *coûte qui coûte*, one must be prepared for the toughest struggle for their possession. If taken and held by the enemy they give him a *point d'appui* from whence he can launch out suddenly on the main position, or they will at least afford him a cover from which to annoy you; so they must always be held to the last, and garrisoned by the best and steadiest men. If several small villages or farmhouses come into the line of the position, it is always better to retire the line of infantry, so as to run from the rear of one village to the rear of another—in other words, to be the curtains to the bastions formed by the villages. The same remark applies to any redoubts or other field-works it may be considered advisable to erect at important points along the front line.

If time permits, all villages immediately in rear of the position that are within easy artillery range of an attacking enemy should be destroyed, and larger openings made through them for the free passage of troops. Unless this is done the enemy's shells are certain to set them on fire, which must inevitably occasion much confusion, and interrupt the free communication of troops and ammunition.

The formation of each division into two lines with its own independent reserve, as shown in sketch on page 258, has many advantages. It renders the command of each general of division more compact, as it is easier to exercise control over troops deployed in two lines and occupying a front of about 1200 yards with a depth of some 2000 or 3000, than if deployed in one line, and occupying twice that front.

Brigades in the same division become more attached to one another as they mutually support each other in turn.

This system, however, has the disadvantage of granting to subordinate generals the power of using the second line and the reserve at their own discretion, which some are prone to do too early in a battle. We all know of the repeated messages Wellington received during Waterloo from different general officers praying for support; his answer was always the same, 'You must do your best and hold the ground,' although at that moment he had reserves at hand that he might have used.

This use of reserves, or even of the second line at too early a period of the day, is the most dangerous of all faults. In deciding when and how to use your reserve remember that the worst use you can put it to is to fritter it away piecemeal.

Whenever it is necessary to use it, the circumstance ought to be imme-

diately reported to the general in chief command. Brigades ought not, except under peculiar circumstances, to be divided part in the first and part in the second line. The senior S.O. with each army corps will point out to the principal medical officers the positions for the Field Hospitals. All good buildings in rear that are well out of fire should be made available for wounded men.

In conclusion, it can only be added that all arrangements made should have constantly in view the object to be obtained by fighting, and that under scarcely any circumstances is a position worthy of the name that does not afford facilities for assuming the offensive at any moment, nor are the arrangements creditable unless everything is prepared for doing so.

As these arrangements must, in every instance, be made by the staff, great is their responsibility.

Every arrangement should be made in the chief of the staff's pocket-book, previous to the action, for the two results, *i.e.* victory or defeat. He should have all the details carefully written out, so that, at any moment, he could give, almost without any reflection, orders in either case: this is all the more necessary for retreat, as then everything depends upon regularity and precision; if there is confusion there must be loss, if not disaster.

Disposition of Troops for the Attack of Positions.—The use of arms of precision has rendered necessary a modification of the tactics which were so successful for purposes of attack at the beginning of this century, it is therefore urgently recommended to all officers to examine carefully the tactical arrangements used by the Prussians in their late offensive battles.

The army, as usual, is to be preceded by advanced guards on all the roads made use of. (See Article on "MARCHES.") They should be very strong in artillery, with which the attack may be begun as soon as the enemy's position is approached within range.

The operation should be considered under two phases:—

1st. The army has halted within sufficiently easy distance of the enemy to make a march of some miles with the intention of attacking as soon as it arrives, as the allies did at the Alma.

2nd. It has halted at too great a distance for that purpose, so it marches up to him, and bivouacs for the night, to attack next morning, as Napoleon did at Waterloo.

It occurs sometimes that two armies are marching one after the other with an interval of from six to ten miles, the advanced guard of one being in constant contact with the rear guard of the other, and that the army in rear is most anxious to bring the other into action; they may have marched in this manner with partial skirmishes for several days, when unexpectedly, in the middle of some march, the retreating force is found halted,

and drawn up to receive battle.* Under such circumstances, with an enemy who had not previously been beaten, when the contending forces exceeded 20,000 each, it is useless commencing a battle late in the day, for one cannot expect to win a decisive battle, and be able to follow it up before night sets in.

It is usual, therefore, to spend the evening in making all preliminary arrangements for the next day's fight. Under these circumstances, the arrangements are those described as No 2; but should the enemy be demoralised from previous defeats, or other causes, he ought, as a rule, to be attacked whenever he turns to show fight; under such circumstances the arrangements are those described in No. 1.

In the first instance it is taken for granted that the staff have learnt from spies, maps, reconnaissances, &c., a great deal of the enemy's position, whether and how he is entrenched, how his flanks are posted, &c.

The nature of the country and its communications must determine the mode of advance; but it should resemble as closely as possible the order in which it is intended to fight, covered by a screen of cavalry, or by a line of moving outposts as an advanced guard.

There should be no hesitation on their part, for they must sweep away everything between them and the enemy's position.

During the march as many staff officers as possible should be in advance. It is advisable to make a few prisoners, who should be at once questioned.

The more roads used the better, as less time will be taken in deploying. If the country is uninclosed, like the Crimea or India generally, the advance might be in columns at deploying distance.

The nearer you approach the enemy the more essential closing-up towards the front becomes. The infantry and artillery should march on roads as much as possible, the cavalry marching through the fields.

In some instances, where it is known that there are bridges to cross, or other obstacles that may require work to be done, it may be necessary to send on all the royal engineers with the advanced guard. As all offensive battles must be begun by a heavy artillery fire, the great bulk of your guns should be near the head of your columns.

As soon as the enemy has been discovered in position, the advanced guards of the several columns in which the army is advancing to attack should deploy into fighting order, all the available artillery opening fire, the batteries from the heads of the columns joining those already in action with as little delay as possible. Under cover of this artillery fire from one-half or two-thirds of all your guns, the infantry deploys, and the C. in C. makes his reconnaissance of the enemy's position. As many S.O.s as can be spared, scattered along the front and getting as near the enemy as they

* *The battles of Busaco and Salamanca are good examples.*

can with safety, availing themselves of all commanding ground in his vicinity, can materially assist their chief in ascertaining how the enemy's position is occupied, &c. &c. All information so obtained should be communicated to the C. in C. without delay. The enemy's weak points must be sought for, and a clear decision arrived at as to the localities, the possession of which would so endanger his retreat, that he would have to fight at a disadvantage to recapture them, or to fall back to save his communications, or the occupation of which would so cut his line into two or more distinct portions, that one of them might be effectually crushed before he could reinforce it in time to save it. Upon this decision will depend the formation that each division will have to assume, according as each arrives in presence of the enemy. It is essential that all deployments should take place well beyond effective range of the enemy's batteries.

The 1st line of infantry, composed of a brigade from every division (as shown in sketch on p. 258), formed into three lines (as described at p. 278), will engage the enemy along his entire front: the 2nd and 3rd lines, composed of the other brigade and of the odd battalion of each division, will be in quarter columns at deploying distance, or in such other formation as is best calculated, according to the nature of the ground, to screen it from the enemy's fire. The 1st line will thus have 3 battalions, the 2nd 2, and the 3rd, or Reserve as it may be called, will have 2 also. The distances between these lines may be considerable—say 1000 yards—at first, but they should be decreased as the action proceeds.

In future, owing to the long range of all arms, attacks upon the centre must be very exceptional: the flanks will be the points to aim at. The flank to be attacked having been selected, a gradual extension of front in that direction should be initiated, false attacks being made upon the other flank. In all flank attacks and wide turning movements, especially those made to distract the enemy's attention from the real point aimed at, the assistance of cavalry and mounted infantry is most valuable.

As artillery cannot, henceforth, owing to the deadliness of infantry fire, be in line with attacking infantry, it is very desirable that the configuration of the ground opposite the selected point of attack should enable you to maintain an artillery fire upon the objective points up to the last moment before making the final and decisive charge with your infantry, and that a similar advantage should be denied to the enemy. Whenever you can secure this double advantage, you have many chances in your favour that, *cæteris paribus*, ought of themselves to secure you success.

As stated in many other places in this book, all attacks must in future be made by the skirmishing line, which should be constantly reinforced, each reinforcement pushing the line on nearer and nearer the enemy, until at last you have established within striking distance of him a force having all the strength of a regularly-deployed line, without any of

its stiffness or slowness of movement. Such a skirmishing line formed here and there by a few files only, at other points where a dip in the ground affords shelter, by several companies, taking advantage of every little inequality of surface in front to push on nearer and nearer to the enemy's position, will soon find some chink in his armour, some weak point from which he will recede, and thus enable you, by working in there, to take the stronger parts in flank. This operation should be assisted by every available gun that can be brought to bear upon the enemy's infantry and cavalry. The configuration of the ground can alone decide the extent to which artillery can assist in such attacks, for unless there is rising ground somewhere, either immediately in rear of the attacking infantry, or on either flank, from which the batteries can keep up a well-sustained fire upon the particular point to be gained possession of, without interfering with the movements of the infantry, artillery cannot now-a-days directly assist in such an operation. It may by a well-sustained fire upon the enemy's forces in other parts of his position—the nearer the point to be attacked of course the better—prevent reinforcements being sent from distant parts of his line to the threatened quarter, but it can do no more. As described further on, in the article upon the "EMPLOYMENT OF ARTILLERY IN ACTION," batteries cannot now be safely taken nearer than 900 yards to the enemy's musketry fire : they cannot, as formerly, accompany attacking columns during their advance, for the purpose of opening fire within canister range of his lines. There is much nonsense talked at present about the increased necessity for artillery; and some officers, who are intelligent upon most points, would have us double the number of guns in our divisions, forgetting how difficult it is to obtain positions for numerous batteries when acting offensively, from which advantage can be reaped from them. Artillery may assist to win, but cannot of itself win a battle; a battle can only be gained by infantry seizing upon the enemy's position, the fruits of victory being secured by an active cavalry, mounted infantry, and H.A. pursuit. Troops acting on the defensive would be generally so posted as to suffer little loss from artillery fire, which, except when directed upon columns or closely formed up troops, has a much greater effect upon them by its terrifying influences than by the actual injury which it inflicts.

Constant pressure upon the rear of the skirmishing line must be maintained by pushing on companies after companies, till at last its very strength impels it forward. The exact moment for doing so to be decided by a senior officer actually on the spot: one in the rear cannot tell when the proper moment for such a charge has arrived; one must be in actual contact with the enemy, and in the midst of the men about to charge, enabling you to feel the pulse of both sides as it were, in order to know and appreciate clearly when the moment has arrived for rushing upon the

enemy. At the distance of about 200 yards in rear of it there should be a line of supports of such strength that they should, when deployed, form or nearly form a regular line. In order to be very strong for this attack, it will be necessary to weaken your line elsewhere. This requires care, and can best be accomplished safely by false attacks, or demonstrations made by attacking from such weak points, so as to prevent your enemy, if possible, from following suit: indeed, your success may entirely depend upon being able to deceive him; so when you have decided upon the point of attack, you must use all your cunning, not only in order to conceal your intentions from the enemy, but by well-devised artifices lead him to expect their opposite. Your attack being successful upon the selected point, your whole line should press forward, unless you can hope, by pouring in troops through the gap made in the enemy's position, to take his troops elsewhere in flank and rear, and so make large captures of prisoners; in that case it would be better to hold him to his ground by a well-sustained skirmishing conflict in his front, whilst your successful troops operated upon his flank.

Such, in the author's opinion, is a brief outline of what attacks must be in future, and if he is correct, an entire change in our system of skirmishing, and in our offensive tactics is absolutely necessary.

If, however, during the march you come upon the enemy in position, as the French did the English at Busaco, or that in advancing to attack, you meet the enemy marching to attack you, as the French did the Austrians at Solferino, more time will be required to deploy and make all arrangements for attacking. The first thing to be done is for the advanced guard to take up some defensive position, as it is assumed to be some four or five miles in front of the main body; positions sufficiently strong for this purpose are to be found everywhere, for before it can be seriously compromised, support will have reached it. The general commanding should at once hasten to the front to make his reconnaissance of the enemy. Having done so, he must send out his orders to the several divisions, informing them where they are to deploy, &c. It is evident that all such dispositions must entirely depend on whether it is intended to await the enemy's attack, or attack first yourself, and in this latter case upon the point of the enemy's line that it has been resolved to attack. On the ability with which this has been selected depends whether the results will be great or insignificant in the event of success.

When it has been decided to await the enemy's attack, it will remain to be considered whether it is better to reinforce the position taken up by the advanced guard with the main body, or to withdraw the former to a position taken up by the latter.

Employment of Cavalry in Action.—As has been laid down in the

Article on "POSITIONS," the first essential is, that cavalry should be placed on ground where it can act freely.

The trot is the true manœuvring pace for cavalry: if changes of position, and the advance preliminary to charging are made at the gallop, the horses are blown, before that moment, when brought into actual contact with the enemy, they should be able to exert their greatest speed.

The ground should be hard level, and free from hedges, ditches, ravines, woods, or fences; nothing is more trying than vineyards, over which no cavalry can gallop. The debated questions of arming and equipping cavalry and of its general organisation, are foreign to this subject. Whether our cavalry is to be changed into mounted rifles, or to remain as it is at present, assisted by special corps armed with long-ranged rifles trained to fight on foot, it will be, in the opinion of the writer, an unfortunate day for the English general who is called upon to fight an enemy who has a proportion of good cavalry, whilst he himself has none, being deprived of them in pursuance of some cleverly stated theory.

Without cavalry it is really impossible to obtain information of the enemy's doings, or to keep up your communications efficiently.

The cavalry arm should consist of young men; an old man, as a rule, is out of place in its ranks, either as an officer or as a private. It wants the dash and fire of youth; age brings caution, and with it, hesitation.

Time is the great element in all battles; but, with cavalry, minutes are nearly as important as hours are to infantry.

The use of cavalry may be briefly stated as:—

1st. To charge upon first coming into the enemy's presence, for the purpose of gaining time, whilst the infantry deploy and a sufficient force is got into position to keep the enemy in check.

2nd. For charging cavalry or infantry, if possible in flank, that had been repulsed in their attack upon infantry, so as to complete their rout, and take prisoners.

3rd. To cover the retreat of infantry repulsed in its attack upon the enemy's position, and either by charging, or assuming a threatening aspect, to prevent it from being followed, as done by the Russian cavalry at the battle of Tchernaya, and by the Austrians after Sadowa.

4th. To check a serious attack from infantry upon the position, by forcing it to form square, either by charging, or by threatening to do so.

5th. Charging batteries that cannot otherwise be silenced. This should only be resorted to when they can be taken somewhat in flank, or when they are but weakly supported.

6th. Grand charges in force upon infantry. Unless the infantry has been well shaken by a heavy artillery fire, or is of an inferior quality, or is taken at a disadvantage, such as in the act of deploying, or some other manœuvre, these grand charges are but waste of men and horses, if made

against infantry armed as at present. Circumstances may, however, render it necessary to make this sacrifice for the purpose of gaining time.

7th. To disperse and cut up lines of skirmishers that had ventured too far into open ground; two or three squadrons are enough for this purpose.

8th. Supporting the flanks of columns pushed forward to attack, and so protecting them from charges of cavalry.

9th. Taking up the position vacated by such columns of attack, or filling any gaps that may occur in the line during an action, or at first whilst the troops are getting into position.

10th. Being victorious, to pursue an enemy *à outrance*, allowing him no time to rally, or even to breathe after his defeat.

The duties enumerated under these ten heads comprise what may be termed the fighting uses of cavalry; and although very recent examples of each can be cited, may serve more as warnings of what to avoid than as models to be copied. The days are past when battles were to be won by charges of imposing masses of horsemen, but the necessity for having with every army a large mounted force is as great now as formerly. The front of a manœuvring army should be covered by a screen of cavalry detachments, from which patrols and scouting parties should spread out like a fan. See Article on "SCOUTING," page 218.

11th. Furnishing detachments, patrols, and scouting parties to the flanks, front and rear, to guard against surprise, to obtain information of the enemy's doings, and to screen your own from his observation.

During engagements cavalry should be withdrawn from view and fire as much as possible. Infantry can always find more or less shelter from fire by lying down, and the smallest slope in its favour screens it; but with cavalry it is otherwise. It should be in rear of the infantry, and as little exposed as possible. Its speed enables it to be so placed, and yet be always available, for it can reach the front line before an enemy marching from his position to attack it can do so.

All reasoning soldiers know that a single man on foot is better than a single mounted man, both being armed alike; indeed it is rather a matter of doubt in the writer's mind, if a man on foot with a long stout stick could not baffle the best of dragoons on horseback, armed only with a sword. But there is always an "if" in such questions; a large proportion of men on foot get flurried when they see a man on horseback charging down upon them with a bright sabre flashing in the sun, and the moral effect of a large number of such men charging in a formed body is much greater in proportion; the very noise of the horses galloping has a terrifying effect that frequently goes home to the heart of infantry, particularly if it has been at all shaken previously by artillery fire. The writer has witnessed more than once the dread entertained by good infantry for cavalry when in action. This must be familiar to all officers who have

commanded skirmishers, or their supports when advancing under fire. Let there be the slightest suspicion of cavalry charging, let but a few horsemen show themselves in the vicinity, and I have always found it to have a most unsteadying effect upon the men.

Doubtless a good deal of this arises from our system of drill, by which our men are constantly practised in forming square to resist cavalry. The writer saw three battalions armed with rifles form square, by order of their Brigadier, to resist a horde of Tartar horsemen, who were cantering up towards them, although it was known that their principal weapons were bows and arrows. It is a favourite argument with those, who, basing their opinion on theoretical notions, think that cavalry is a species of anachronism, to point to the smallness of the numbers actually killed by that arm in action. If the same calculation was made regarding artillery, it would be found that the actual loss it inflicts upon the enemy is in no proportion to the high value put upon it. Its moral effect is powerful; it frightens far more than it kills. Infantry when repulsed must ever be more or less susceptible to the influence of a well-timed charge of cavalry upon its flanks or rear.

In all cavalry encounters with cavalry, the side that is able to bring up a fresh reserve when his opponent has exhausted all his, will, as a rule, win the day.

It has also become an axiom that the same squadrons can seldom be got together for more than one grand charge in a day; theoretically this sounds strange, but experience has proved its truth.

For this reason a large proportion of the cavalry should be held in reserve up to the last possible moment; and, if practicable, kept fresh for the pursuit, to follow up the broken enemy, or else for the final *coup de grâce*, when it is desired to overwhelm the enemy, who is already supposed to be somewhat unsteady.

The moral effect of cavalry increases in geometrical ratio to its numbers. It should never be frittered away during an action to fulfil objects that could have been attained equally well by the employment of infantry.

The collection of great numbers of cavalry into masses, after the fashion of Napoleon, is not now recommended. In the newly approved organisation for our army, the cavalry is divided amongst the divisions and army corps; a regiment to each of the former, and a brigade to each of the latter. The G.O.sC. divisions and army corps will therefore always have at their disposal enough cavalry to let slip upon an enemy becoming disagreeably adventurous, or whose tactical errors had rendered him open to attack. The opportunities for the employment of cavalry in small bodies are frequent in even the best regulated battles, but they are very fleeting: it is therefore essential that the officer commanding the cavalry of divisions, &c., should always accompany the generals commanding them, so that

when an opening for the advantageous use of his arm occurs, he may receive his orders at once, and by galloping back, or sending an orderly officer back at that pace, bring up his men in the nick of time, and catch the enemy in *flagrante delicto*, before he has time to rectify his mistake. The superior speed of cavalry enables a general to cull in this manner fruits from an action which would be beyond his reach if he had but infantry only under his command.

The officer commanding the cavalry ought to be of a quick, zealous temperament, always eager for a chance to employ the arm under his orders : he ought to be the Prince Rupert of the army ; he should be young, active, a daring rider himself, and always foremost in a charge ; he should pride himself upon his position, and try to make the humblest trooper feel likewise ; he should, above all officers in command, 'covet honour' like a true sinner ; he should be a man prompt of decision, and prepared at all times to act upon his own responsibility.

Cavalry should be distributed on the flanks, or at parts of the line where it can act rapidly. The cavalry in reserve to be in rear or at places where it could be most efficaciously used, remembering that it takes from three to four hundred yards from its starting-point to that of collision to require the swing required for a telling charge.

Cavalry can only fight in line ; to charge in column is to expose a deep formation to fire, whilst its value is only in proportion to its actual front. The sooner we arrive at the formation of rank entire the better.

In charging infantry the distance between the 1st and 2nd lines should be about 200 yards, and the same between the 2nd and 3rd. In charging cavalry, these distances should be about 450 yards.

The preliminary movements of all arms, before the actual collision with an enemy, should be made well out of fire ; this applies more forcibly to cavalry than to the other arms, for having no fire, and its only action being the charge, if charged whilst performing any change of formation, it will certainly be dispersed. A daring leader will under such circumstances charge at the head of any body that may be at hand, no matter how small, and by so doing, help and give time to the main body to form and charge also.

Like infantry, the weak part of cavalry is the flank.

For the employment of cavalry after an action, see Article on "PURSUITS."

The employment of cavalry to obtain information, to guard the flanks and rear from surprise during an action, to make raids upon railways, &c., is treated of in the Articles on Scouting, Outposts, Patrols, Advanced Guards, &c.

In conclusion, it should be instilled into the mind of every cavalry soldier, that his arm of the service is invincible, and more than a match under all circumstances for infantry or artillery, either singly or in masses.

If he thinks otherwise, the sooner he exchanges into the infantry the better. Every cavalry officer should be a fanatic upon this subject.

There is no excuse for cavalry soldiers being made prisoners as long as their horses can gallop.

The first and most important duty of a cavalry soldier is to take good care of his horse at all times.

Mounted Infantry.—The Dragoon of 150 years ago has now no representative in our army: he was a foot soldier on horseback; he had the fighting, training, and arms of a light infantry soldier, and the rapidity of locomotion belonging to the hussar. Such is the man for outpost, advanced and rear guard duties, and, in conjunction with really good cavalry, for patrol and reconnaissance work. Galloways, or even mules, if horses are not to be had, will do for mounted infantry, so the creation of this force cannot interfere with the supply of horses for the cavalry and artillery. In level countries, a small proportion might be carried on light carts. This force could be raised at any moment by calling for volunteers from the infantry. The proportion between mounted infantry and cavalry might be, I think, three or even four to one, for all duties except those enumerated under the first seven of the ten heads that in the preceding article I have divided the purely fighting uses of cavalry into. When we have again to take the field, it is to be hoped that our cavalry, the finest in the world, may be supplemented largely by mounted infantry.

Employment of Infantry in Action.—Infantry is the backbone of an army. Campaigns can be carried on without cavalry or artillery, but nothing serious can be effected without the aid of men fighting on foot. At the end of a war it will be found that, putting sieges out of the question, the actual damage done has been by infantry. It is its fire that kills and wounds, and its charges that win and defend positions.

If it is very good, it can compensate for inferiority in the quality and numbers of the cavalry and artillery. If bad, and you are opposed to a good steady infantry, make it a war of marches and manœuvres, engaging in daily little affairs until you have brought your infantry up to a fair standard of excellence.

Infantry should, when stationary, always lie down, both for the purpose of concealment and of shelter from fire.

The four ways in which British infantry have been hitherto accustomed to fight are:—

1st. As skirmishers, both in attack and defence.

2nd. In position in line, with their fire, for defensive purposes.

3rd. An advance in line to attack an enemy, such attack ending by a bayonet charge.

4th. In square to receive cavalry.

Skirmishing.—Formerly specially instructed men were required for this work, but now no infantry is of any value in the field unless it can skirmish well. It was a noble trade that of the light infantry soldier, and an army that had really good light troops was indeed happy: it could sleep at night in security, and could march at its ease, safe from surprise at all times. In action, the enemy's sharpshooters were kept by it at a respectful distance, whilst his gunners were harassed at their guns, their horses shot, every joint of his armour tried, and the weak places thoroughly probed by a searching fire; his plans discovered, the position of his reserves made known, and all his columns approaching to attack riddled with bullets.

Formerly a line of skirmishers was used in action to clear the way for the attacking lines or columns in its rear, but henceforth it must be itself the most important part of the attacking line, and upon it will fall the brunt of every battle. Skirmishers must learn to forget the old lessons they were taught as to their special functions in action; they must rely to a very great extent upon themselves to capture positions, and not look entirely to a formed line in their rear to do so. The days when a stiff deployed line of men, shoulder to shoulder, could advance under fire, full as they are of glorious memories for our army, can never come again, and the officer who would now dare to attempt such an operation under the fire of breach-loading rifles should either be tried for murder or lodged for life in a lunatic asylum; it behoves us, therefore, not only as an army but as a nation to lay down new rules for the guidance of our infantry in action, and to alter our drill so that it may be strictly in consonance with them. The normal formation of infantry for battle used to be in three lines, as 1st line, 2nd line, and reserves, the front being covered by a line of skirmishers, with their attendant supports and reserves, the 1st line and the 2nd being of equal strength. Henceforth the 1st line, of the same relative strength, will be divided at the beginning of an action into at least three formations, the front one being skirmishers, that behind it being supports to be sent forward to reinforce the skirmishers from time to time as required, and the third being the main body of the 1st line. In order to prevent confusion as far as possible, it is most desirable that, when the supports have been blended into the skirmishing line, battalions, and even companies, should be as little mixed up as possible. This is a tactical problem to be worked out by those skilled in drill, and H.R.H. the Field Marshal commanding the army has lately published some experimental manœuvres on the subject. A certain amount of confusion must ever be attendant upon an operation of this nature. In reading of the advance in line of English infantry during our most celebrated battles, we hear much of its steadiness, and but little or nothing of the great disorder that accompanied it; but all soldiers who have taken part in such an operation know well that disorder is inseparable from it when attempted

under fire. In confessing that we shall have to grapple with disorder in the manœuvre by which alone it is contended we can in future successfully assail an enemy's position, we do not therefore admit any new element in the operation, although we may have to deal with it under somewhat less advantageous circumstances than formerly. In an army, the less there is of harmony existing between its regulation tactics and the tactical requirements of the age, the greater will ever be the confusion attending its infantry attacks. Having recognised that disorder will be the never-failing attendant upon an attack made by skirmishers, let us set to work to practise our men in the operation until we have reduced that disorder to a well-understood system, until order is evolved from it. To practise men in nothing but 'steady drill,' where noise and confusion is impossible, is not the best way to prepare them for the disorder in which they will most certainly find themselves, even after the most successful charge that is made under fire. Men who have been drilled only in charges made with mathematical precision and death-like silence are prone to be appalled by the din, uproar, and confusion of a real onslaught. Never having been taught to contend against it, or even to realise it, they are dismayed by its unexpected presence. A ringing cheer is inseparable from charging. I do not believe it possible to get a line in action to charge in silence; and, were it possible, the general who would deprive himself of the moral assistance it gives the assailants must be ignorant of human nature. It encourages, lends nerve and confidence to an assailant: its very clamour makes men feel their strength as they realise the numbers that are charging with them. Nothing serves more to strike terror into a force that is charged than a loud ringing cheer, bespeaking confidence. As it is impossible to charge in action without noise, our mimic charges at Aldershot cannot have too noisy an accompaniment, for they would then be all the better practice for officers and men to reform in good order amidst great confusion.

The introduction of breech-loading rifled small arms, and of rifled artillery firing shrapnel at great ranges, have altered the tactical formations of infantry, especially for offensive operations; so much so, that for an army to attempt what we did so lately even as at the Alma, would be to insure its annihilation. No final instructions for the guidance of our infantry in action having yet been issued, I shall dot down here a few general ideas on the subject, assuming that every one now considers as obsolete the fighting tactics of Frederick the Great, which improved by the Duke of Wellington to suit the arms of his day are still alone to be found in our Field Exercise Book. In those days the fire of the individual soldier was not a factor of importance in the problem to be worked out; the effect of men fighting in a formed body, shoulder to shoulder, was alone considered of value; and the tendency of all drill and tactical

instruction was to make men rely upon their united strength as a highly disciplined body. Now, the great object of all military teaching is to develop the power of each breech-loading rifle, and the independent action of the soldier who carries it to the fullest possible extent.

In defensive operations the influence of the new arms is not felt very much beyond the fact that 100 men holding 100 yards of front in any position now, make it far stronger and more difficult of approach for an enemy than if it was occupied by 342 men armed with the old musket, in two ranks, each file covering 21 inches of frontage. The effect of our infantry fire at present is so great, that it has reversed the relative defensive value of ground; for whereas formerly, the close ground that most abounded in cover was generally regarded as very strong, whilst the open portions of a position that were easy of access were looked upon as weak, the very reverse is now the rule. Large open down-like spaces free from woods and hedges, that can be swept from both flanks by a heavy musketry and shell fire, require but few men to occupy them, as no troops could live to cross them; on the other hand, the close country abounding in copses, banks and cover of all sorts, that was formerly considered so strong that it required but few defenders, is now the locality where an attack is most likely to succeed. It is not that it has lost one whit of its actual strength by the new order of things, but open ground being now almost tabooed to the assailant, he is forced to attack those points where alone his troops in skirmishing order can hope to approach their enemy without being mowed down by a fire delivered from troops sheltered from injury either naturally or by means of rifle trenches. The use of a strong force of skirmishers in front of the actual line selected for defence is not now required, and might only lead to the loss of the men so employed. A small number of the very best shots should alone be employed in advance of the actual position, and unless under some very peculiar formation of ground, even these few men should rejoin the main line, when the enemy had reached within 500 or 600 yards of it, lest they should hamper its fire. It must never for a moment be forgotten, that a passive resistance can lead to no conclusive or even telling results: the officer commanding a position to be defended, who does not largely provide for assuming the offensive at many places, and during many phases of the action, is ignorant of war.

The normal formation for troops occupying that portion of a defensive position from which it was intended to assume the offensive as soon as the attacking troops had reached from within about 50 to 100 yards of it, should be, I think, a first line consisting of one man to every yard, each company deployed for this purpose keeping a section about 20 yards in rear, or as near the first line as cover could be procured or provided for it. These supporting sections are merely for the purpose of supplying men to fill up gaps in the first line caused by casualties. Behind this again, if possible, not more than

50 yards from the first line, but well covered from fire, should be a line two deep with bayonets fixed and ready at any moment to jump up, and running over the first line to charge the attacking enemy. I know that it is the opinion of the best German authors at present that the side acting on the offensive has the best of it, but I humbly submit, that with a British battalion distributed as described above, four companies having three sections each in the front line under cover (occupying a frontage of 300 yards), and with four companies behind them again, ready to charge as soon as the enemy reached within charging distance, that twice, nay thrice its number of the very best troops in the world would be easily destroyed by it. Picture to yourself the shattered condition in which two, or even three battalions advancing to the attack would reach within charging distance of the first line that from behind good cover had been firing on them at ranges that had been previously measured and marked on the ground. Of course this manœuvre is easier to describe than to carry out satisfactorily in an action, but the same is the case to my mind ten times over as regards the operation of carrying a line of skirmishers over open ground by successive rushes to within charging distance of the enemy's position. I do not believe it possible for a man who has never himself led skirmishers in action to dogmatise upon what they are capable of doing, or to lay down rules for manœuvring them under fire as if they were so many pawns on a chess-board. It is not enough for a man, say as a staff officer, to have seen the operation, he must himself have led men up 'the deadly breach' to enable him to realise what men will and will not do, or even attempt. It is not intended to assert that such an offensive movement is impossible, especially if the space to be traversed affords plenty of cover, but all who have led men in a charge when exposed to heavy fire, will I think agree with me in saying, that the operation can never be successfully carried out, unless the defenders have been demoralised and beaten into that most unhappy state of stomach that invariably precedes a general stampede.

In the distribution above given, the troops in the first and second lines should be under the same commanding officers; the reserves, to be detailed either by divisions or army corps (according to circumstances), should be about 600 or 800 yards in rear of first line, and posted so as to be as much as possible under cover and out of sight.

The one great difficulty in carrying out these defensive tactics is for the general to choose the right moment for charging, as the success of the operation depends greatly upon the offensive being assumed exactly at the right time.

To await in the open an advancing enemy, and depend upon driving him back by your fire, is to court danger. The writer is aware of the Hythe theories, that go to prove how an advancing line would be annihilated; but firing at a target is a very different affair from firing at a thick line of

skirmishers advancing steadily towards you, who keep up a heavy fire all the time. In all such attacks there is a moment when the defendant must charge, or be defeated.

Experience in war teaches the general to feel, as it were, from the pulse of his men when that moment has arrived. Happy is the man who knows when to say 'Up Guards and at them!' There is no salvation for him who cannot do so. The opportunity passes in the twinkling of an eye, and if not seized on at the right moment cannot be expected to return.

In the foregoing argument it is assumed that the artillery fire is equal on both sides; for although the assailant may have most guns, still they will have to come into action under a heavy fire from those of the defensive side, they will be firing at unknown ranges and without cover, all of which circumstances will be reserved in favour of the artillery of the defence.

For offensive operations, the great problem to be solved is, how can you get within infantry charging distance of your enemy without being destroyed, or so reduced by losses that any attempt to charge home would be folly. Upon this problem all the great military minds of Europe are now intent. In general features, it may be safely said that the system that all will adopt will be similar, although of course the peculiarities of race and of military traditions will naturally impart a national individuality to each.

It is unnecessary to give figures illustrating the destructiveness of breech-loading fire delivered from behind cover to prove that it would be impossible for infantry in line, two deep, each file occupying 24 inches of front, to march up to any position, no matter how brave that infantry might be; the proposition is self-evident to all who will give the subject a moment's thought. The result of the Prussian attack upon St. Privat, and of other similar operations at the beginning of the 1870 war, prove that an infantry attack over open ground is a useless waste of life, until the defenders have had their courage crushed out of them by an overwhelming fire of artillery and musketry. To attempt such an operation nowadays in line or in columns would be madness: the only other formation is in skirmishing order. Much nonsense has been written in endeavouring to throw odium upon this formation, because it is described as 'loose.' A man who knows what skirmishing is, and who has himself taken part in it under fire, is well aware that all skirmishing must be loose, but to be well done it requires the best drilled soldiers. To teach a man to march past as if he were part of a wall is comparatively easy when compared with teaching one to be a really good skirmisher. Most men will admit that henceforward our manœuvres under fire must be made in open, or in other words, in skirmishing order. Does it not therefore behove us officers of all ranks to work hard until our men are really the best skirmishers in the world? Are we doing so? If not, are we not preparing for ourselves and for the

nation a great disaster when next we have to meet a European enemy in the field?

I shall not attempt here to go into the vexed question of the manner in which our skirmishing order of battle is to be formed; we must await the issue of official orders upon the subject: but in the mean time my advice is, let all commanding officers spare no time or trouble in making good skirmishers of their men, in teaching them the art of cover, in impressing upon them their real strength, and how little even the smallest knot of men or the thinnest skirmishing line has now to fear from cavalry.

They should be taught by their captains the art of advancing by rushes at full running speed for about 50 yards at a time, these advances to be made by echelon of sub-divisions.

The men should be practised by battalions in charging when in a skirmishing, and therefore a loose line that had been successively reinforced, until there was about a man (not a file) per yard: these charges to be practised over the roughest ground, and through woods when possible, being invariably accompanied by a ringing cheer. The men should have their arms at the trail, for of all the devices to prevent men from charging well and with enthusiasm, that of making a man bring his left hand across his stomach to help the right, in clutching the rifle, is most ridiculous.

My own belief is that the time has arrived when infantry should work in single rank, and that each man should have at least 30 inches of frontage allotted to him at all times in line. It would teach our men self-confidence, and wean each from that system of always leaning for support upon a man behind him: it would also allow of all our manœuvres and drill formations being performed with much greater ease to the individual soldier. Drill is now more essential than ever in the formation of an army; but instead of teaching a man complicated evolutions that may have a fine theatrical effect in Hyde Park, but which are about as useful to a soldier in action as a knowledge of the hornpipe would be, let us drill him day after day, and if necessary all day, in the manœuvres of battle, until he is proficient in them.

The disorder that resulted upon infantry attacks during the wars of 1866 and 1870 arose mainly from a want of harmony between the 'Regulation' tactics of the armies concerned and the tactical requirements of this age of breech-loading rifles.

In the distribution into lines of an infantry force, whether a brigade, division, or army corps, for an attack upon an enemy in position, I would recommend the proportions to be about one-half for 1st line, one-third for 2nd line, and one-sixth for a reserve, *i.e.* in the respective proportion of 3, 2, and 1. The first line at the opening of an action should be again re-divided into three lines, as is the rule at present for battalions employed as skirmishers, one-fourth of it being thrown forward as skirmishers to cover a space about

as wide in yards as half the total number of men in the 1st line: thus a battalion of 1000 rank and file acting in the first line would cover a front of about 450 yards, 250 men being thrown forward as skirmishers, 250 kept as supports in small columns, or at places in fours, or in line according to the nature of the ground, and 500 held in similar formations in reserve. The deployment of infantry from column of route into attacking order should be carried out before it can be injured by the enemy's artillery fire: the distance therefore depends greatly upon the nature of the country, for if quite open, the deployment ought to be effected at about 2500 yards from the enemy's position. The supports should be about 300 yards in rear of the skirmishers, as artillery fire aimed at the skirmishers is not likely to hurt the supports at that distance in rear of them; the nearer they can be kept to them however, as long as there is good cover, the better: the main body of the first line to be about 500 or 600 yards in rear of the skirmishers. The officers commanding companies in all these three lines must lead their men in the formation best suited to obtain from the ground the utmost amount of protection from fire that it is capable of affording, the field officer seeing that a general alignment is roughly kept by all. This system of forming the companies according to the ground they are moving over is a necessity, especially from the moment that each successive line reaches the supposed limit of what is now commonly known as 'the zone of unaimed musketry fire,' namely, at about 1000 or 1200 yards from the enemy's position. At this distance it will be necessary for all officers on horseback to dismount and leave their horses behind.

It is a moot question whether the supports should be composed of a portion of the companies in their front, or be whole companies; the writer is in favour of the former system, as it will to a great extent help to keep companies from intermixing.

The infantry fire of the defensive side begins to tell most seriously when the skirmishers reach within about 600 or 700 yards of the enemy's position (the extreme limit of what is commonly known as 'the zone of aimed musketry fire'). Thenceforward the advance must be made by rushes of about 50 or 60 yards at a time from one cover to another, or if the ground is devoid of cover, the men must throw themselves on their faces at the end of the rush; this should be done by alternate companies. At this phase of the action the serious losses begin, and the officers commanding the supports must use their own discretion in supplying the places of those knocked over in the skirmishing line.

The skirmishers should continue to advance quietly, those who are lying down firing as quickly as possible whilst the others are making their rush forwards, and this must be continued until they reach from about 60 to 200 or even 300 yards of the enemy, that distance depending very much upon the amount of cover to be obtained. Whilst the skirmishers are thus

advancing, the main body or reserve of the 1st line keeps steadily pushing on, as best as it can, in line when such is possible, or by independent companies in whatever formation their captains may consider best, when the fire is too heavy for a line. By the time that the skirmishing line has reached the required distance from the enemy, all the supports will have been merged into it, and the main body of the 1st line ought to be within about 100 yards of the skirmishers: it will then be for the officer commanding to decide whether he will at once make his charge there and then, or wait until he has succeeded in bringing up the main body within a few yards of the skirmishers taking care not to allow the main body to mingle with them, as it is essential to keep the main line from firing. It is to be hoped that when this phase of the action has been reached, the heavy fire of the skirmishing line may have made an impression on the enemy, and as soon as this impression has been effected, every bugle should sound the advance and double,* and the officers rushing to the front should carry on with them the main line, the skirmishers joining with it in the charge. When a line lying down or under cover is engaged in independent firing, it is most difficult to stop the firing, and get the men to charge unanimously, it is therefore essential that the main body of the 1st line should not be allowed to fire previous to the charge. In many cases it may not be perhaps necessary to use this main body, as the skirmishing line, upon being reinforced by the supports, may be impelled forward by its own weight, especially as it is always possible in a long line of attack that the skirmishers may find some chink in the enemy's armour, some weak point from which he has a tendency to recede, and taking advantage thereof, may carry it with a rush. The combined action of the three arms in such an operation has been sketched out in the Article on "DISPOSITIONS FOR THE ATTACK OF POSITIONS," the foregoing being but a general rough outline of what is now almost universally accepted as the proper formation of infantry detailed for an offensive movement.

The formation of Battalion Squares to resist cavalry may be almost regarded as a thing of the past, for with the long ranging arms of the day, to put your battalion into such a formation would be to give it over to destruction: small company squares, or groups of men standing shoulder to shoulder, and availing themselves of any hedges, trees, or any other obstacle there may be at hand, can now hold their own well against any number of cavalry.

General Remarks regarding Infantry in Action.—Above all things, never allow your men to fall out to pick up wounded men: that duty must be performed by the ambulance corps, aided by the bandsmen of regiments, who for this purpose should follow close in the track of the attacking lines. At any rate, the wounded must take their chance till the operation is

* *We are sadly in want of a bugle sound for the 'charge.'*

finished; they should remember that the wounded of those who win are generally well looked after, whereas those of the vanquished side generally fare badly. As every man who falls out to look after the wounded reduces the chances of success, it is especially their interest to prevent men from doing so.

The issue of every fight depends upon the behaviour of the infantry, and their conduct depends upon the company's officers, who are of all others the most important body of men in an army.

In that final moment of actual conflict, the result is in their hands. Drawn from the gentry of England, their courage has never been impugned, not even by the most radical of newspapers. Hence, in a great measure, our unvarying success in infantry and cavalry charges. It is at such times that a man's mettle is shown. The company officers have a busy time of it in action. They must be careful that their men do not waste their ammunition. This is now all the more necessary, from being armed with breech-loaders.

Immediately after charges it is most essential that they should re-form their men at once, and not permit them to go beyond the further limit of the wood, village, &c., &c., that formed the objective of their attack.

Our battalions on war strength are henceforward to be over 1000 bayonets: our existing system of drill is not applicable to those of more than 500, or at most, 600 men, as it is based upon the idea that the C.O.'s voice can be heard by every man in the battalion when deployed: apart from the fact that it is physically impossible for one man's voice to command 1000 men in the bustle of action, the rigidity and consequent slowness of all movements effected by our system of drill when applied to battalions of such strength renders it inapplicable to warfare under its newly assumed phase. The one great idea of commanding officers has been, hitherto, '*to keep their men well in hand*,' and that all companies should move off at the same moment by word of command from the colonel.

Our cavalry drill has always been in advance of that laid down for our infantry in this respect, inasmuch as it was left to the captains commanding troops and squadrons to place their men in the new position of formation they had been ordered to take up. Our rigidity of movement looks very pretty in Hyde Park, but is unsuited for war: it was copied from the Prussians, who used it, as we did also, to excellent purpose where the effective and destructive range of musketry did not extend beyond what a soldier could run over in charging, and when not more than one, or at most two rounds, could be delivered by the defenders during the time occupied by such a charge. I think we shall again have to follow that nation in their system of tactics, adapting them to the peculiarities of our soldiery, but letting our men '*go*,' instead of always endeavouring to keep them *in hand*.'

It used to be said of us that we were the only nation that could fight in a two-deep line. In such a formation we charged and overthrew Napoleon's finest troops. We have now to go a step farther, and to teach our men to charge with the bayonet in skirmishing order, trusting that the same pluck which enabled us during many consecutive years to annihilate by our line charges the best European troops, may enable us henceforth to do the same by means of our superior skill as marksmen, and by the irresistible dash of our skirmishers.

EMPLOYMENT OF ARTILLERY IN ACTION.—The introduction of rifled guns into the service has increased the range of artillery; but as the limit of vision still remains unchanged, this alteration has not increased the distance at which artillery can be used effectively to the extent that is supposed by many. To open fire beyond the limit at which the effect of your fire can be ascertained by good sight, aided by telescopes, is merely to waste valuable ammunition; that limit is about 2500 yards. The maximum of effective range in yards for the undermentioned guns is as follows:—

	At Columns.	At a Line.
40-pr. B.L. guns (Armstrong's)	2800	2500
9-pr. M.L. „	2500	2000
12-pr. B.L. „	2500	2000
9-pr. B.L. „	2000	1500

From the experience of recent wars we learn that fire cannot be maintained from a battery exposed to infantry fire, so guns, unless screened from view by either parapets or the natural configuration of the ground, should not be placed within 900 yards of the enemy's infantry; if during the course of an action the enemy's infantry succeeds in reaching to within that distance of a battery, the gunners of which are not screened from view, it should retire beyond that range. The duties of artillery in action are, to begin the fight; to maintain a heavy fire upon the enemy's troops whilst yours are taking up the positions assigned to them; to overwhelm with its fire the portion of the enemy's position that has been selected as the point of attack, so as to shake the courage of its defenders, and facilitate the advance of your infantry; to extricate any portions of your force that may have become temporarily compromised; to co-operate in pursuit, and to protect the retreat of beaten troops. Formerly when guns were taken up to within a few hundred yards of the enemy's position, it was easy to lay them with precision for short distances, but to do so at long ranges is a different matter, requiring time and very great nicety, as the exact distance has to be ascertained. The fewer the movements executed by a battery the longer it will be in a position to inflict damage upon the enemy, for it is a recognised axiom, that guns are useless when limbered up. It is

therefore of great consequence that good positions should be found for the artillery before the action begins, and that when posted there, it should not be moved unless the enemy succeeds in bringing a musketry fire to bear upon it, or that in being driven back, he retreats beyond its range. A few hundred yards either backwards or forwards makes but little difference in the effectiveness of fire from rifled guns. In selecting these positions for your artillery, it is desirable that the ground in its immediate front should be as unfavourable as possible to the enemy's artillery fire ; for this reason soft cultivated land, marshes, precipices, or any steep escarpments, such as the banks of a canal or the side of a railway cutting immediately in front of the guns, is a great protection to them. Although it is a mistake to place guns on such a high position that their shot strikes the ground below at so great an angle as to lodge there, instead of ricocheting, yet it is essential that they should have sufficient command over the space by which an enemy can approach to see clearly all his movements, whilst they from being on high ground present only their muzzles to his view, their waggons and horses being entirely screened from his observation. It is absolutely necessary that every portion of the ground in front of your position should be raked by batteries to the right and left, as well as swept by a direct fire. The effect of artillery fire is more moral than actual : it kills but very few, but its appalling noise, the way it tears down trees, knocks houses into small pieces, and mutilates the human frame when it does hit, strikes terror into all but the stoutest hearts. Artillery should be used either in very large batteries, or the fire of many batteries placed at intervals should be brought to bear upon one point at a time ; previous to attack a concentrated fire from all the available guns should be brought to bear upon the spot selected as the objective point. At the battle of Gravelotte, where the Prussians were the assailants, over 90 per cent. of their killed and wounded had been hit by the chassepot bullet, whilst only 6 per cent. were hit by artillery fire. This should be constantly impressed upon the minds of your infantry soldiers.

In defensive operations it is desirable to place batteries in those parts of your position that may happen to be naturally strong, the flanks of which particularly are secured by existing obstacles from cavalry attacks.

If the fire of infantry and artillery is to be effective at one and the same moment, commanding positions must be selected for the latter, from whence its rifled guns can play with accuracy and safety over the heads of the infantry moving below them.

Except from the attack of infantry skirmishers, the front of artillery may be considered secured by its own fire, but its flanks are especially weak.

When it is necessary to have an escort with a battery, it should take up its position on the most exposed flank, keeping well to the rear under cover ; when the battery moves, its escort moves with it. If there is, near a battery,

any cover in which the enemy's skirmishers could lodge themselves, it should be occupied by the escort. When obliged to change position, batteries should move as rapidly as possible: H.A. having its gun detachments mounted, can do so at a gallop when the ground permits, but at present our Field Batteries cannot go out of a walk, as the detachments march on foot. It is hoped that this may soon be changed, and that the off horses of every gun team may carry a gunner, as was always the practice in the Bengal H.A. If this were done, with the seats for two gunners now existing on our gun-carriages, Field Batteries might change positions in action at as fast a pace as the ground would permit. The quicker such changes are executed, the shorter is the time that the guns are useless. For this reason, when H.A. are retreating with cavalry before an enemy, the changes of position to the rear should be executed by the guns at the fastest possible pace, the cavalry retiring, as laid down in Regulations, at a walk, but never faster than a trot. The same rule should be followed in cavalry advances; the H.A. should gallop forward and unlimber within easy range of the enemy, the cavalry not moving until the guns had opened fire, or unless it was found that they were getting nearer the enemy than they were to their own cavalry. In order to reap the greatest possible benefit from the H.A., the cavalry should keep as far to the rear of the guns as possible with due regard to their safety, until their fire having told upon the enemy, it should charge to take advantage of the disorder and confusion they have occasioned. The artillery fire should be kept up as long as it is possible to do so without danger to the advancing cavalry, and when obliged to stop, the guns should remain unlimbered, ready to re-open should our charge be repulsed; if it has been successful, they should limber up and gallop forward to seek for some fresh position from whence to pound the retreating enemy.

It is laid down by the best modern writers upon Artillery, that at every phase of an engagement the action of one particular arm of the service is most important. At one moment it may be the enemy's cavalry, at another his artillery, and so on; but whichever it may be that you have to dread most at the time, upon it your artillery fire should be concentrated. Before infantry were armed as at present, artillery in action was chiefly used by both sides in counter-battering, as it was supposed that if the enemy's artillery fire could be reduced and kept under, your infantry might advance in comparative safety to try its strength against that opposed to it. It is the infantry fire which is now to be dreaded most; so, as a general rule, it is upon it that artillery fire should be brought to bear most. This rule applies with greater strictness to offensive than defensive operations: in the former, the one great object is to annihilate and strike terror into the infantry defending a position by the loss inflicted upon it by your guns; in the latter, as the infantry may be safely left to take care of itself, and

may be relied upon to drive back from its front all assailants, the bulk of your guns may be most profitably employed in pounding the enemy's artillery, so as to distract its fire from your infantry. Of course, if it is found that the enemy's columns are pressing on, and that he is massing troops for an advance, his attacking forces assuming then the most prominent importance, should receive most attention from your artillery, as already laid down.

It is sometimes necessary to commence an action by opening fire from all the guns available at the moment, in order to keep the enemy at a distance whilst the lines are being deployed, and the troops are getting into their positions. It is sometimes used also in changes of front or position during an action to cover the movement.

If by any unfortunate circumstance a gap occurs in the line, and the enemy seems intent upon taking advantage of it, a large number of guns deployed to fill it up may save the army from disaster. To cover the retreat of lines or columns that have attacked and been repulsed, the fire from a large number of concentrated guns is the best protection.

Artillery in action should always have the greatest possible front.

When guns are charged by cavalry, the gunners should stand to their guns to the last moment. When the cavalry are close, they must according to circumstances, take refuge, lying down close outside any infantry squares that may be formed near them, or under their guns. It is a pity that all men of gun detachments have not breech-loading pistols; with them they might easily hold their own against cavalry from under their guns, the limbers having retreated for protection to the nearest infantry.

In offensive operations, the ground in the vicinity of the point to be attacked must be swept by a heavy cannonade from a mass of batteries, previous to the attacking force being launched forward on its mission. The heaviest possible fire should be maintained up to the last moment possible, and when at last the attacking forces have advanced into such a position as to impede the fire, the batteries should, if possible, be advanced into such other positions that they can reopen. It is at such moments that the devoted gallantry of artillery is truly tried, for in some instances it is necessary to sacrifice a battery to insure success. Surely there never has been a more noble feat of arms than that performed by a troop of French horse artillery on the 8th of September, 1855, when at the gallop it took up a position on what might be termed the glacis between the Malakoff and Little Redan, from whence it maintained a heavy fire upon the Russian columns endeavouring to retake the Malakoff, until the troop was actually annihilated.

In fine, the efficient employment of artillery in action depends upon that employment being *àpropos*. Six H.A. guns opening a fire at exactly the proper moment will be of greater use, and have a greater effect upon the

final result, than twice that number merely pounding away without any special object.

Gassendi says, in writing on Artillery in action, "Les derniers coups sont les plus décisifs, ils feront votre salut peut-être, mais votre gloire sûrement."

Passage of Rivers.—To cross a wide and unfordable river with a large army, even when unopposed, is a tedious operation, requiring nicety of detail. It is almost needless to say that every exertion should be made to have as many bridges as possible. In drawing up the memorandum for general orders, the chief of the staff should go into minutiæ, stating the hour at which each corps is to pass, and the manner in which it is to do so, also the position it is to take up at the far side. A staff officer will remain in charge at each end of each bridge, having a small guard under his orders. No collection of men, carts, or animals to be allowed within a couple of hundred yards of the bridge-heads on the far side, and no crowding on the bridge to be permitted. No one but generals and staff officers to be allowed to go back over the bridge until all are over. The men to be cautioned not to keep step in crossing temporary bridges. To cross a river whilst an active enemy is on the other bank demands a well-designed plan, ably carried out in all its details by an efficient staff. Stratagems should always be resorted to, and the enemy deceived as to the point of crossing, in such a manner that a strong brigade or division should be across before any organised resistance of large numbers can be offered to it. Much depends upon the breadth of the river. If it is not wider than about 300 yards, and a re-entering angle, with the banks higher on yours than on the enemy's side, has been chosen as the point of passage, the front and flanks of the force first thrown over the river can be so protected by musketry fire that nothing can prevent you from crossing. The first thing to determine is the most advantageous position for the passage. The configuration of the river to be such that batteries established on the near bank can command the ground on the opposite side. Long re-entering loops, that are frequently to be found upon sluggish rivers, are invaluable for this purpose, as it stands to reason that no enemy in force could remain in them under the cross fire that would be brought to bear on him. A small river flowing into the large one on your side, some short distance above where it is intended to cross, is of great use, as in it the rafts to form the bridge—and indeed, if the current is not rapid, the greater part of the bridge itself—can be put together without creating any alarm, and floated down to its position. Long wooded islands, with the main channel between them and you, leaving the channel to be passed over from them to the enemy's bank a very narrow one, are of great advantage in enabling you to lay your bridge and cross over in considerable numbers

before the enemy can concentrate. At the point selected the banks should be free from marshes, so that wheeled carriages can get down to the river, and if possible there should be deep water close to the banks. If not, arrangements must be made beforehand for laying out trestle piers to such a distance that the boats or pontoons can float and not ground when laden. A narrow belt of timber along your bank is a good screen behind which your army may assemble without being seen. It is desirable that the bridge when laid should be screened by the banks, or by rising ground or woods, from the enemy's view and fire. (See Article on "DISEMBARKING IN FACE OF AN ENEMY.") The two operations are very much alike. The enemy having been deceived by false reports and by demonstrations upon distant points, it is taken for granted that the army is to cross at a point carefully selected and secretly surveyed by a staff officer. The width of the river to be carefully measured, and the bottoms examined to see that there is good holding for the anchors. If the enemy has a bridge over the river, defended by a tête de pont on your bank, this renders the operation much more difficult, as he can pass over and attack you in rear whilst you are crossing. It will then be necessary to watch his bridge-head with a strong corps, and perhaps make demonstrations as if you intended to assault his works. In framing the orders for the passage of a river, the Q.M.G. or chief of the staff will see that the head of the column should reach the spot selected as soon as it is dark. The columns intended to make diversions upon other points, in order to draw attention there, should arrive at their destinations a little before, taking care that they are seen by the enemy. When it is dark a good deal of noise should be made with hammering and talking; and if it can be done safely, a few men put across to keep up a musketry fire upon the enemy's patrols, piquets, &c. The strictest silence to be maintained where the operation is really being carried on, and the rafts put together. A battalion of the best light infantry to be ferried across at such points that it can cut off the enemy's piquets if there are any there, and extend in skirmishing order in a semicircular form, both flanks resting on the river. The troops first over should consider themselves as an advanced guard, and be guided by the instructions laid down under that head. They should fire as little as possible during the night, endeavouring rather to take prisoner all patrols or outposts that interfere with them. A proportion of boats should be employed in ferrying across reinforcements whilst the bridge is being laid. As soon as one is finished, the others must be commenced as quickly as possible. As soon as a brigade is over, strong working parties, carrying their arms and tools, should pass over, and, under the direction of engineer officers, and as many sappers as can be spared from the bridges, set manfully to work to intrench the position. The R.E. who is to design the works should pass over with the first that cross, having a few sappers with tapes to mark out the lines.

Batteries of heavy guns will be placed at points previously fixed upon, to open fire at daybreak, if necessary, along the front and flanks of the position taken up by the forces that had crossed during the night. The extent of ground occupied on the opposite bank should be enlarged every hour as more troops cross. If necessary the horses of cavalry and artillery can be swum across. If a hundred horses are taken over by the bridge and collected on the opposite bank, others can be driven into the water in flocks, taking care to allow no gap, but to keep up a continued stream of horses, When this has been established, it is easy to induce them to enter the water and swim across to the others on the farther side. One-half or two-thirds of the men of each troop should previously cross in boats or by the bridge, to receive the horses on the far side, each man carrying his arms and valise. When there is a bridge the horses should be swum over near but below it. When cavalry pass a floating bridge, they should dismount and lead their horses. The writer was Q.M.G. of a force that had to cross a rapid river in face of the enemy, there being no bridge equipment, and only a few canoes. Some 2000 horses were swum across as described above, with the loss of only an old one, that could not stem the very rapid current. It would have been madness to have allowed British dragoons to attempt swimming their horses over such a river. When the emergency of circumstances require the attempt to be made, the men should undress and hold on by the manes or tails while crossing, never touching their horses' heads, and guiding them by splashing water at their heads on the side from which you wish them to turn. If the enemy concentrates to fight, the baggage and parks, &c., should not be crossed over until he is driven away.

Previous to a force crossing a ford of any size, rows of stakes should be driven in, showing its exact limit. If the current is strong, ropes should be stretched from pole to pole, and mounted men posted along its upper limit, to break the force of the stream. Torches or lanterns should be used at night to mark the line of crossing. When the stream is strong the men should pass in the broadest possible front, locked arm-in-arm: if also deep, each rank should be several paces from the other, for if a column passes in close order, it serves to dam up the stream, and so deepen it. When the current is rapid, boats should be kept plying about near the dangerous places, to pick up any one who may be swept away.

Defence of Rivers.—If your enemy is as strong as you are, and he has the means of crossing anywhere along a front of 20 or 30 miles, he will do so if he wishes, but you ought to make him pay dearly during the operation.

The better your arrangements for defending the river, the more it will cost him. Indeed, if he makes mistakes, you can inflict such injury upon him that he may be only too glad to get safely back. Suppose an unfordable

river separates you from your enemy, which he has the means for crossing anywhere for a distance of 30 miles—that is, 15 miles above and 15 below where the main line of communication, whether road or railway, crosses it. Of course, if you had time, the bridge there would be well covered by a strong tête de pont. To attempt to guard every point where he can cross would be to render yourself weak everywhere, so the best general plan is to keep your army concentrated in a central position, establishing good lateral communications with your flanks. The entire length of the river must be well watched by your patrols, and arrangements made beforehand, so that when all your outposts have been driven behind the river you can still have means of communicating with your spies on the opposite bank, and keeping yourself well informed of the enemy's movements. Strong detachments should be posted halfway along the exposed distances on either flanks, the strength of which must depend on the size of your army. Telegraph wires to be laid down from one flank to the other at some distance from the river, so as not to be easily cut by the enemy, and night signals to be established as well, to render you independent, even supposing the wires have been destroyed. Three guns fired at half-minute intervals, to be repeated three times, with intervals of five minutes between each time, can be heard safely at distances of three or four miles in ordinary weather. Beacons set fire to upon elevated ground will convey the news that the enemy is crossing at certain points. The officers in charge of posts where these signals are to be made should have their instructions regarding them in sealed envelopes, to be opened only when they have positively ascertained that the enemy was crossing. This would prevent any chance of its becoming known what those signals were to be. The commander, from his central position, should be ready at all moments, by means of his transport carriages and bât animals, to convey a strong body of infantry quickly to support his detachments in any direction. The latter should at once proceed to the point of crossing, and vigorously attack the first body of the enemy that crosses over. The crossing will most probably be attempted on a dark night, when such an attack is likely to succeed; for if troops that have just crossed over are attacked in a determined manner they will fancy you are strong, and hesitate to advance over ground they know nothing of. Some time ago it was proposed to use a burning fluid made from some preparation of naphtha, which would burn on the water. If this could be poured on the water a few hundred yards above where the enemy was making his bridge, and set fire to, it would not only burn his boats and bridge material, but throw such a light upon his movements that he would have to desist. If this fluid preparation is to be had, it should be experimented on before it is required for use. A commander having reconnoitred well beforehand all the ground over which the enemy has to move on the opposite bank, should keep in his memory the advantageous points

for crossing, and, putting himself in the enemy's position, consider what he would do were he in his place. Having thought well over the matter in all its phases, he should fix on plans for all contingencies. His chief difficulty will be—when some night he receives notices from his outposts, at several points, that the enemy are preparing to cross in their vicinity—to weigh the several accounts and make up his mind as to the true point of attack. No amount of money paid to spies for secret intelligence should be spared to obtain early notice of the enemy's intentions. Large numbers of boats collected at any one point is an indication of the locality he means to cross at. Strict watch should be kept upon all reconnoitring parties sent out by him, so that the points examined by them should be known. If the inhabitants are friendly, it is half the battle. It is the duty of the troops who first reach the crossing-point to delay the construction of any intrenchments as much as possible, and to hinder that of the bridge. The locality in which it is attempted, and the relative strength and morale of both armies, must decide whether an offensive movement from the tête-de-pont against the enemy's flank, as he attempts to cross, shall or shall not be made. If successful, it is ruin to the enemy; but if not, it is ruin to you. To pass a river in retreat is similar, as a tactical operation, to that of retreating through a defile, for which see Articles on "REAR GUARDS" and "RETREATS."

Sieges.—The operations in connection therewith may be divided into—1st, the investment; 2nd, reconnaissance of the place to decide upon point of attack; 3rd, opening and carrying on the trenches until ready for the (4th) assault.

THE INVESTMENT.—It is of the utmost importance that the commander should keep his intention secret, so that it should be a surprise, and the enemy found unprepared. The movements of the army should apparently tend towards some other object in a totally different direction, when by long forced marches the several corps intended for this operation should appear simultaneously before the place, driving in all outposts at once and cutting off all detached parties that may be out foraging, &c.

It demands the very nicest arrangements as to time (to be made by the Q.M.G. or Chief of the Staff); in the routes given to the several columns it must be laid down imperatively, that, come what may, each column is to be in the locality, if not in the exact spot, each evening that is indicated in the route.

This route should be copied into the pocket-books of the officer commanding each column and his senior S.O., and this should be done so that, if it fell into other hands, no one could divine it to be an order of march. No other copies of it are to be made. If each day's movements were written upon pages in different parts of the book and lettered, the first day being

A, the second B, and so on, any one reading the book would only find at different parts of it descriptions of various places with the best positions for encampment, &c.

The true object of the movement should only be known to those two officers, but a false one must be found, and when within one or two days' marches of the place, excuses must be found and made the subjects of general conversation for having deviated from the previously announced intention, the true one being denied up to the last day.

There is no operation that can test the efficiency of the staff more than this one.

THE RECONNAISSANCE OF THE PLACE must be effected by driving the garrison well within the works, when a close inspection of them and the ground in their vicinity can be made. There are but few places in Europe of which some plans cannot be had; the roughest will be of the greatest assistance in coming to a decision as to the point or face to be attacked. The C.R.E. having made the minutest possible inspection of the works, will draw up a plan of attack, which he will, if necessary, explain in detail to the commander.

The mode of conducting this operation is described under the head of "1ST CLASS RECONNAISSANCES."

For all subsequent operations of the siege, it is most important that staff and engineer officers should study the almanac well, and keep before them the hours of sunset, sunrise, and of the moon's rising and setting, so that all possible advantage may be reaped of every hour of darkness.

OPENING AND CARRYING ON THE WORKS.—Soldiers are apt to think that during a siege the engineer should alone be the directing element; it is a great mistake; he can only form the plan, but almost the whole of the details for carrying it out must devolve upon the troops, and consequently the staff, if they do their duty, have lots of work. Apart from their duties in camp, which have already been fully gone into, it is their duty to see that the communications between divisions, and parks and trenches, are properly established, and that the reliefs of the trenches are duly carried out, at the hour and in the manner appointed. A staff officer should conduct each relief to the trenches, and hand it over to the S.O. on duty there. For small, well-fortified places the besieging force should be ten or twelve times the garrison; for large and first-class places from five to eight times the garrison. The guard of the trenches should be about three-fourths of the strength of the garrison. The camps should be sheltered from view of the place, at about 2 or 3 miles distance from it, according to the nature of the ground. The nearer they can safely be placed to the trenches, the better; as every extra mile to be marched over is of great consequence to

hard-worked men. The engineer and artillery park must be above all camps screened from its view and fire; their position must depend upon the roads, as it is well to have them near the main line of communication running to the rear and towards the centre of attack. If none exist in the latter direction, one should be laid out as soon as the position is taken up. It is also essential that roads, or at least tracks, marked by a line of large-sized stones, should be laid out from the parade ground of each division to the spot where the reliefs enter the trenches. It is well sometimes to erect cairns of stones in prominent positions along their track as landmarks.

The magnitude of the siege must decide whether the trenches are to be commanded by a general, brigadier, or colonel, and also as to the staff that should attend; as regards the latter, I am of opinion that the officer or officers required for this service should have no other duties to perform. Say that three have been named for this service, one to be always in the trenches; I am sure that the army would reap incalculable benefit from this arrangement.

A line of electric telegraph should be laid down between army headquarters and the parallel nearest but one to the enemy, where ought to be the headquarters, as it were, of the trenches.

The names of all field officers to do duty with the guard of the trenches each day and each night, and the exact strength of the latter, with full details, should be notified some hours before they reach the trenches to the staff officer on duty, who, acting under the instructions of the general commanding in the trenches for the time being, will detail the officer to command in each parallel and sap, and those that are to command the various working parties. The senior engineer officer should be in the trenches with the general at least an hour before the reliefs arrive, to explain what he wishes done, and the number of men he requires to do it. The working parties must then be told off by this staff officer for the various batteries, &c. In fact every disposition of the men for each tour of duty should be laid down in a pocket-book some time before the relief arrives. The staff officer will meet it, as it enters the trenches, and without halting the men, as they pass down the first boyau or approach, will tell off the several corps. The strictest silence to be maintained by the reliefs going on and coming off duty, any remissness upon this point to be severely punished. It is most essential that every battery should have a signboard erected in it, giving its number in large characters, and if the trenches are extensive, finger-posts should be placed wherever parties could go astray, pointing out the way 'to No. —— battery,' &c. These little but most important things were never attended to before Sebastopol, because there was no organised trench staff. It is the duty of the staff to see that the men have means of obtaining drinking water.

They will supervise generally the duties in the trenches under the general's orders, bringing to his notice all irregularities, &c. To do this well they should make frequent rounds of the trenches during their tours of duty; they must see that the conservancy of the trenches is properly attended to, and that a sufficient number of latrines in safe places are provided.

The dispositions for protecting the working party will be made by them.

The night that ground is first broken, the outposts of the enemy must be driven in. This will be done everywhere opposite all positions occupied by the several corps of investment, and as it is taken for granted that it has been done for several days previous, it is to be supposed that the garrison remain in ignorance until the next morning of the exact front opposite which the trenches are to be opened: their attention may be drawn to another direction by a few men being employed here and there along some 1000 yards in making a noise with pickaxes, by occasionally showing a small light for a moment, and by constantly talking. It is easy in this manner to cause it to be believed that the trenches are to be opened there. When this has been done, the first parallel will be traced by the engineer officers on duty, in the twilight, just before it is dark.

A covering party of about two-thirds of the strength of the garrison to protect the working party must be told off, to be partly composed of the troops employed in driving in the enemy's piquets. Strong parties must protect each flank of the working party; they should lie down under the nearest cover; the nature of the ground must determine the position of the covering parties, who should be placed also lying down about 100 yards in front of the working party, having sentries posted again in front of them about another 100 yards. The reserves should lie down just a few yards in front of the working party. When these distances can be safely increased it is advisable to do so.

The working party to consist of one man for every 2 yards of work to be performed. A large number of S.O.s should be employed to conduct this party, and in order that there should be no confusion in placing the men in the positions they should occupy when at work, a rough division of it should be made on paper previously, a S.O. being told off to every 300 or 400 yards, who should accompany the engineers in tracing it, and make himself well acquainted with the locality, so that when he joins the working party on their division parade ground, he should have no difficulty in leading it straight to its appointed place. He should have put down some marks, such as a stick or a small pile of stones, to mark the right and left of the portion his party is to execute; previous to conducting them he should have made up his mind exactly as to the precise paths he intends to follow in leading them to their position. All working parties should enter that alignment on the msae flank of their portion of the work, to prevent confusion,

and then extend regularly towards the other, each man being 6 ft. apart; it is of the utmost consequence that not a moment should be lost, and that as soon as each man is placed he should at once commence with pick and shovel. These working parties should parade at the engineer park, one or two hours before sunset, to receive their tools from the engineer officer in charge of it, each man taking a pick and shovel. The working party that is to break ground should take no arms with them, as they are well protected by the strong covering party, and the first night they are not likely to be disturbed by sorties; all subsequent night working parties should be armed.

The usual tour of duty for a working party is 8 hours, but in the formation of the first parallel it is advisable to keep the first working party employed until an hour before daylight; say that ground is actually broken at 8 P.M., by 4 A.M. a trench 3 ft. deep, 5 ft. wide, and 6 ft. long should be completed by every man; it is advisable to arrange so that the night working party should be relieved before daylight.

As soon as day begins to break, the covering parties must be withdrawn, their places being taken by a trench guard at the rate of one man to every two yards; for as the working party have their rifles and are distributed in the same proportion, there will be, in case of a sortie, a man to every running yard of trench. Concealed in some undulation of the ground, about 500 or 600 yards in rear, there should be strong reserves of infantry; and upon each flank, well under cover, there may be a squadron or two of cavalry, if the ground is favourable for that arm. This is all the more necessary if any cavalry are shut up in the place. It may sometimes be expedient to keep some horse artillery guns with these flanking detachments, or have them ready at a short distance in the rear.

The senior staff officer on duty every twelve hours should make a full report of all that takes place, during his tour of duty, to the chief of the staff.

4th. THE ASSAULT.—The breaches having been reported practicable, or the fire of the place having been so completely reduced, that together with other favourable circumstances, the commander determines upon assaulting the place. The following are general rules that should not be forgotten in drawing up the order for doing so. Knowing the history of the 8th September, 1855, do almost everything in a manner exactly the reverse of what was then arranged for our assaulting detachments—I cannot call them columns. It is only by pushing on your masses to the point attacked that you can succeed. Remember that if your advanced parties capture the work, and are driven out from want of support, it is not the fault of the soldier, but of the officer who planned the operation. It is no time to talk of loss of life; if you fear, or cannot afford to lose numbers, try something else, but do not in mercy's name attempt an assault,

The commander must be in direct communication with the assaulting troops. He should, therefore, be in the parallel nearest the breach, or if trenches have not been opened, he should be under the nearest cover. The attacking forces to be divided into three portions: 1st, the storming parties; 2nd, supports; 3rd, reserves. Each of the first two to be equal to about half the garrison of the work to be assaulted; the reserve to be equal to the whole or certainly three-fourths of the garrison, and to be well placed for following up the supports. The nature of the work to be assaulted must determine the number of assaulting columns and the manner in which the storming parties are to be divided.

It is most essential that attacks should be made upon several places at the same time, one or two only being real ones. The false ones should be at places far away from the others, and large numbers of men should be shown to give them an imposing air. The real ones must have ladders if there are deep ditches, and a certain number told off to carry tools, as many of the latter as possible being engineers. Each column should have as many engineer officers as possible with it. Each column to be composed of the largest possible organisation, so that battalions and divisions should be as little cut up as possible. Upon every occasion, have the party that is first to enter the enemy's works composed entirely of volunteers, and led by volunteer officers. If the result is a success, all the survivors of these volunteers should be rewarded and petted in every possible manner. If this is done at your first siege, the second made in that war will be an easy affair. When it is possible to do so keep up the heaviest of artillery fires upon all parts of the work where it can be done without danger to your troops. A firing party should be thrown out right and left of the stormers, who should join the support when the place had been entered. Cram on your reserves close on the heels of the supports; remember that the slightest check costs many lives, and that of all the reckless operations in war, a feeble assault, feebly supported, is the worst. If, as I said before, the advanced parties force their way in, and remaining there some time are subsequently turned out, it is a blot on the commander's escutcheon which should never be forgiven. The manner in which the garrison does its work must determine the hour of assault. The configuration of the ground and the size of your trenches will also influence it, for if you can get no other cover for your supports and reserves, you must assault at daybreak, so as to be able to get them in their proper places under cover of the night.

Defence of Places.—The duties of an officer appointed to command a fortified place are to make himself thoroughly acquainted with every inch of ground within two or three miles of the glacis (this is a duty equally binding upon all staff and engineer officers under him), and to have fully

detailed lists made out of all the warlike material. The C.R.E. to report upon the defences and of the work that should be done. The heads of all departments to send in reports as to their wants and the means at hand of supplying them in case of a siege. Steps to be taken at once for remedying all defects complained of, and for supplying all their wants. As long as the enemy is still distant more than three marches, the troops ought to be encamped outside the works, the main body to be some miles off. This is a good precaution on the score of health.

The commandant and his staff should study the weak parts of the line of defence and endeavour to rectify them.

If there is a civil population, the police service should be most strictly carried out, and lists made of those that are to be turned out as soon as there is any prospect of attack. All allowed to remain to be forced to lay in provisions for the same length of time that the garrison is prepared for. The necessary sanitary arrangements to be carefully gone into, and an organised system established for putting out fires by a body of the civil population. The fire-engines to be inspected, and repaired if necessary. The best buildings to be prepared as hospitals. The water supply to be looked to, and measures taken for increasing it if there is any chance of its being interfered with by the besiegers. The provision of bomb-proof accommodation for the garrison to be reported upon by the C.R.E. Supplies of rough timber for this and other purposes to be collected from the country. All cover within a mile of the works to be destroyed. All suburbs and houses without the fortifications to be levelled. The civil population to be forced to assist in all these works up to the time when it shall be deemed necessary to force them to leave the place. Spare your soldiers up to the last moment, and get as much work as possible done by the non-combatants. The internal communication to be improved, and measures taken for destroying all those outside the place that can be of use to the enemy. As to gain time is the one great object of the defence, every little bridge destroyed that the enemy must repair adds so many days or hours to the existence of the place. If the provisions collected are in grain, preparations must be made for grinding it. If biscuit is to be had, it should be kept as the last stand-by. Every endeavour should be made to draw upon the resources of the surrounding country up to the last moment, and to leave as little as possible there for the enemy. If there is no time or opportunity for collecting supplies from outside, all those in possession of the inhabitants and private individuals should be seized, so that equal distributions may be made to every one during the siege: unless this is done, some may be living luxuriously whilst others are in want if not starving. If this had been attended to, Metz might have held out longer, and the garrison of Lucknow would have been better fed. Distribute your magazines of powder and provisions as much as possible, looking

to the eventuality of fires as regards the safe custody of both. The outpost duty should be well organised, as also the means of obtaining information of the enemy's movements by spies, &c. If the inhabitants are hostile, they must be disarmed, and the most careful watch maintained over their movements. The garrisons for all parts of the works and outworks to be detailed most accurately, and provision made for sorties. As soon as the enemy penetrates to within three days' march of the place, his movements must be carefully watched by a small force, so lightly equipped that it should have no *impedimenta*, so that it can harass his advance as much as possible, and learn his intentions by a well-organised system of patrols. The best marksmen of the garrison to be employed in constant skirmishing with the enemy. The morale of the defenders to be maintained by every possible means; their honour and patriotism to be appealed to; the belief in succour from without to be instilled into their minds. When the enemy approaches, every advantageous position of ground to be obstinately contested, as long as it can be done without compromising either the safety or morale of the troops, the main body of whom are to be kept outside the works as long as it can be done with safety, and the efforts made to drive you inside them resisted in every possible way. When forced to retire within them, endeavour to ascertain from prisoners the enemy's intention; to find out the number of guns and their calibre in his siege train; is he provided with scaling ladders; has he large stores of sandbags, gabions, &c.; what is his strength; what face he means to attack, and where he is encamped. Small reconnoitring parties can do much in this way. At night, an officer with a few men, knowing the localities—the very hedges even—can creep up near him. When the trenches are opened, the amount of energy to be displayed in sorties must depend upon circumstances such as the probabilities of being relieved, and the strength and spirit that animates the garrisons. If the siege is to be a long one, the energies of the defenders *doivent être bien ménagées*, lest by always having in the end to give way, they should become disheartened. However, the longer a bold front can be shown, and the longer you can maintain yourself beyond the glacis, the longer will you be respected by your adversary, and give confidence to your people, and the longer you will be able to annoy the enemy. A few well-directed sorties that strike terror, are of more avail than a series of partial ones which kill but few. As soon as the enemy's intentions are pronounced, the face attacked should be retrenched. The governor should remember that as long as resistance can be offered, he is bound to show it, and that if he fail in doing so, he is no longer worthy to be called an Englishman; indeed, he deserves to be shot if he exhibits any weakness in this respect. When all hope is past, then, and not till then, is he justified in making terms, which he can generally secure upon fair conditions if his defence has been determined, and if he can show that he still

has the means of holding out longer. Even at the last moment, if he still commands a disciplined body of men who are in good heart, he may perhaps hope to cut his way out and join his armies in the field. In doing so, if he can carry off two-thirds of the garrison that remained to him, it is well worth trying.

These memoranda are only intended for use when the besiegers are of a civilised nation. When they are Asiatics, the last resource should be to cut your way through them. Never surrender your arms to them; as long as you keep together you can manage to keep any number of Asiatics at a distance. The story of the faint-hearted and ill-advised garrisons of Cawnpore and Cabool should never be forgotten.

In attacking and defending places, all soldiers employed at night as sentries near the enemy, and the small parties or chains of skirmishers thrown forward to watch the enemy, should wear their grey greatcoats. Our coats, when new, are a little too dark, but when some time in use they are, next to the Indian Kaukee and the Russian light brown, the best of all colours for night work.

Convoys.—The nature of the country and its roads, the disposition of the inhabitants, the distance that the enemy is from the line of communications and the degree of enterprise that he may be given credit for, will decide the difficult question as to the strength and composition of the force to be detailed as guards for convoys of stores or provisions. If the waggoners' loyalty is doubtful, additional force will be required.

If the country is open and the inhabitants hostile, it is a difficult operation to conduct safely a large number of waggons for a number of consecutive marches, for if the enemy is strong in cavalry or mounted infantry, he will cut in upon your convoy at some weak point.

No matter what may be the force detailed, the officer in command to it will, before starting, examine the carts, waggons, and animals, to see that they are in good working order. He should have from 2 to 5 per cent. spare waggons, according to the distance to be marched, and a supply of spare wheels, poles, shafts, traces, ropes, &c. The total number of carts should be divided into divisions of about 100 each, those being again subdivided into 4 sections of about 25. Each division to be in charge of a transport officer, who will have in his pocket-book an accurate list of the waggons and their contents, of the driven horses, &c., in it. The carts carrying the most valuable stores to be always at the head of the leading division. If there are any pack animals, such as camels, mules, elephants, &c., they should precede the wheeled conveyances, or if the nature of the country will permit, they should march on one or both flanks, leaving the road clear for the waggons. All should march upon the largest possible front. On most roads waggons can go two abreast; they should have 4 ft. between them. To

calculate the length of road your convoy will occupy, see Table in Article on "MARCHES." The average breadth of waggons may be taken at 5 ft. In an ordinary country the rate of march is 2 miles an hour. The distribution of the force must greatly depend upon the length of the line of waggons; but under all circumstances the officer in command of it must especially avoid frittering away his strength with a view to protecting every part of the convoy, as by so doing he is strong nowhere: he must endeavour to keep his men together. It is a good rule, applicable to most circumstances, to divide your force into three equal portions: one-third being in the centre as main body and reserves; one-third furnishing the advanced guard, and all detachments required between it and the main body; and the other third doing the same as regards the rear. Infantry is more especially required with the advanced and rear guards, the main body of the cavalry or mounted infantry being with the main body, so that reinforcements can be rapidly sent from it to any point that is attacked. If the country is open, it may be advisable to divide the main body into two, one to march on each flank at about 200 yards or 300 yards from its ordinary position in the line of march. The same disposition would equally apply to all other bodies placed anywhere along the line of waggons when the country admits of it. If there is any suspicion as to the hostile disposition of the drivers, a strict watch must be kept over them by small parties of three or four mounted men told off to every couple of hundred yards. The front, flanks, and rear should be well watched by small patrols of well-mounted dragoons, to a distance of from 2 to 3 miles. The advanced guard, composed of all three arms, should be about 1 or 2 miles in front. With it there should be a small party of pioneers or engineers, carrying tools. The rear guard should be close to the rear waggons. The commander of the whole, as well as of the various parts, must remember that the object is to get the convoy over a certain extent of country without losing a cart or animal, and that they must only fight when they cannot accomplish their object without doing so. If attacked in force beyond his power of resistance, it will be for the commander to decide whether he cannot save a portion by sacrificing the rest. If he is overpowered, nothing remains but to concentrate all his force, and mounting his infantry on the horses taken from the waggons, make good his retreat, or in that manner cut a way through the enemy. All waggons breaking down on the line of march should have their loads distributed amongst the others, and should then themselves be set on fire.

The selection of good defensible positions in which to park the convoy for the night is of great consequence. Whatever may be the form which circumstances may require the park to assume, the guns should be at the angles, so as to sweep the faces. Natural obstacles, such as streams, should be selected to protect at least one of the faces. Strict watch to be kept at

night over the animals and drivers, when there is the slightest chance of the latter being in the enemy's interests.

Convoys are but little required now in European wars, for the main lines of communication are along railroads, or rivers navigable by steamboats. However, in India, many years must elapse ere similar facilities can be expected. During the mutiny the writer took part in convoys where the carts alone extended 5 or 6 miles along the road, from which the enemy's cavalry was only kept at a distance by the great range of our arms, which told so much in our favour in an open level country. Our line of communication in China was by river. It was protected by gunboats as far as it was navigable; above that point we had some villages on the banks occupied by infantry, and all the convoys of boats proceeded along the river with detachments of cavalry on the banks, and infantry on board the boats, guns being added to the escort when required.

STREET FIGHTING.—To be considered under two heads: 1st, fighting to obtain complete possession of a city or town into which you have forced your way, but where the defenders are still prepared to resist; 2ndly, the suppression of insurrection in a city which you hold with a garrison, but where the population is hostile.

The fighting at Lucknow during the mutiny presented examples of both.

1st. It is of great importance to obtain a plan, no matter how rough, showing the streets and the position of the public buildings, and of all squares, or other open spaces where large numbers of the enemy can assemble. If possible, find out from spies, where his main positions are, and the quarter of the town, or the buildings that he has especially fortified as an interior keep, &c.

To open out one or more roads to this central position, or to some commanding point in its immediate vicinity, so as, if possible, to cut his forces into two or several parts, and prevent them from assisting one another, is the first great object to be attained.

Having selected the route or routes by which you mean to force your way, begin by seizing the houses on both sides. When a column finds its progress barred by barricades and the fire from the adjacent houses, every endeavour must be made to turn such positions, by using by-lanes, breaking through houses, and working a passage from one to the other, until you obtain possession of some point in their rear. The defence soon slackens when the retreat of the defenders is seriously threatened. As a rule, it is better to allow them a "a bolt-hole," for if all retreat is cut off from them, it is apt to make them desperate, and a few determined men who have made up their minds to die, may inflict immense loss upon the assailants in street warfare. If you do happen to cut parties off, open a parley

with them at once with a view to their immediate surrender: give them any possible terms, sooner than fight them for possession of the houses they occupy.

If you are advancing in more than one column, open out lateral communication one with the other, wherever it is practicable to do so. Be most careful in following up every advancing column with a long tail of supports, for if small bodies, such as the heads of these columns must ever be, become isolated in a great, unknown city, the men are apt to become uneasy and subject to panic, to which their success, and the fact, perhaps, of having penetrated a long distance without opposition, tends to make them all the more susceptible. Unless men, when fighting in a large city, see their rear well closed up by supports, they become uneasy and hesitating. Fighting under such circumstances is most bewildering work: you hear firing all round you perhaps, and have to make face to the enemy in so many different directions, that it is hard to know sometimes which is your true front.

With the head of each column there should be a party of engineers, provided with hatchets, crowbars, and powder bags. A very strong door can be blown open by 10 lbs. of powder, even if barred and bolted. A rifle bullet fired into a lock will generally destroy it. If the roofs are flat or double, it is essential to make a way along them, when the houses are held by the enemy: if the roofs cannot be used, openings must be made with crowbars, from one house to the other in the uppermost story. In this manner a passage may be opened into the centre of a city without great loss, whereas if the columns are pushed through the streets without obtaining possession of the houses on each side, the losses are sure to be very great, and the operation has a demoralising effect upon the men.

2ndly. To suppress insurrection in a town in which you are garrisoned, it is essential to occupy such positions within it as will enable you to isolate the quarter which is the main stronghold of the insurgents. Having done so, endeavour to divide it up into sections, isolating them one from the other as much as possible. Never attack barricades, or positions, in cities with brute force, but by seizing upon houses or posts in their rear, or on their flanks, force the enemy to become the assailant. Much may in some cases be done towards bringing a hostile population to reason, by cutting off their supply of provisions and water.

BUSH FIGHTING.—As wars like those in Kafir-land, New Zealand, and Ashanti may have frequently to be undertaken by our army, a few lines on the subject of bush fighting may not be out of place here.

It is not wise to send whole battalions organised as ours are to such wars. The savage in the bush has many advantages over the English soldier, and it is therefore necessary before entering upon a bush war to reduce

them as much as possible. He has lived his life in the bush, and its loneliness, its dim light, and its being without paths does not startle him. Take him into the open, and brave as he may be individually, he becomes as scared as our men most certainly do when they find themselves in the bush under fire from a hidden enemy. Of all things I therefore consider it to be essential that the very best men in our army should alone be employed in such a war. Call for volunteers, and take 100, or perhaps 200, men out of as many battalions as may be necessary to make up the number of men required, select the best officers from each battalion to command their own men, and then select from the army generally the best field officers and regimental staff. With battalions formed in this manner, your loss will be much less than if so many battalions are taken because they are first on the roster, and the war will be brought to an end in a much shorter space of time. As fighting in the bush ever resolves itself into a number of little battles between small parties of men, I would recommend that the proportion of company officers to N.C. officers, rank and file, should be 1 to 20.

The men should be armed with breech-loading carbines, and the Elcho sword-bayonet or the naval cutlass, made to fit the carbine as in the navy. The men should be clothed in very dark grey or khaki (the colour of the uniform used in the Ashanti War was too light for a dense forest), and in other respects equipped as were the troops that marched to Coomassie. All officers and sergeants should be provided with pocket compasses: before each action it should be stated in orders what the compass-bearing of the line of advance was to be. All fighting must be by sections, three sections of each company being extended and one kept in reserve. No crowding together must ever be allowed, and when the enemy is approached sufficiently near, he must be rushed at with a ringing cheer if it is possible to get through the bush to do so. Most brave savages will hold their ground in a bush for ever if you content yourself with firing at them from behind trees, but the savage knows well that when the white man runs in on him that it is time for him to bolt. When fighting in the bush upon any large scale (as at the engagements of Amoaful and of Ordahsu), where the fighting extends over a large area, and rages not only in front but on the flanks and in the rear, a great difficulty to be avoided is to prevent your men from occasionally firing in a direction that must hurt their own friends. The officers, with their compasses in hand, should be able as a rule to tell whether it was safe or not to fire in any proposed direction. Be most careful to guard your reserves of ammunition and other *impedimenta* well, keeping parties on its flanks in the bush, and having a strong rear guard to help those parties when required.

Much nonsense is talked about the use of rockets, but I have always found them nearly as demoralising to our own side as to the enemy. If

the bush tracks are good, there is nothing better than the 5½-inch howitzer, but if the piece has to be carried by men or mules, the 7-pounder steel gun is far the best weapon.

Considerable method is required by all commanding officers in bush fighting; if there is hurry, your force gets cut up into several parts without any connection between them, and it is difficult to collect them again for any concerted action. In no sort of warfare is it more essential to have a small reserve kept intact up to the last moment, for it is impossible to see what your enemy is about, or to know where he is until his attacks have actually developed themselves, and panics are more probable in a dense forest than in an open country.

Teach your men to go into the bush: there is no use in lying down and firing, the savage is perhaps better at that game than you are, your only safety is to go straight at your enemy whenever and wherever you see him; this demoralises the savage, and although you may lose a few men in the rush, your loss will be less in the long run than if you endeavoured to turn him out of his position by a heavy fire.

The result of all actions in a dense forest depends upon the company officers, who must to a very great extent rely upon themselves and act upon their own responsibility: it is therefore most essential that all officers to be employed in bush fighting should be carefully selected for that duty.

PART IV.

Military Bridges.—It would be impossible to give in this little book an article on this subject that would be sufficiently explicit for an officer entirely ignorant of mechanical contrivances and the art of bridge-making. Every officer should read again and again the works of Haupt and Sir H. Douglas. With an army there will always be engineers whose business it is to understand bridge-making. All officers are, however, at times liable to be placed in positions where it may be necessary to cross streams or rivers when no engineers are at hand. There are but few countries that do not afford materials that can supply the place of pontoons, provided only there is some one who has the talent to avail himself of them. It is then that a 'staff officer possessed of resource, with the energy necessary to use it properly, may be of more value to an army than the addition of an army corps.'

Engineers who have had experience in colonies or new countries are more useful on service than those whose knowledge is chiefly theoretical, and whose practice is confined to old countries.

When large bodies of troops have to pass a river, and circumstances permit, three bridges will be made, one for infantry, one for cavalry, and a third for artillery ammunition columns and the train.* Columns of infantry, artillery, waggons, and cavalry should not be mixed together in passing a bridge.

Bridges should always be constructed at right angles to the stream.

A roadway of 8 ft. wide in the clear will admit of the passage of infantry in fours, and of all descriptions of military waggons in file. The width to admit of waggons passing one another should not be less than 16 ft.

The width between the hand-rails should not be less than 9 ft. for an ordinary bridge, and not less than 10 ft. if camels, nor than 12 ft. if elephants have to pass over it.

In bridges where there are trusses joined transversely overhead, a clear space of 9 ft in height is required for waggons and cavalry, of 11 ft. for camels, and 15 ft. for elephants.

Ramps at the end of a bridge intended for artillery should not have a greater slope than $\frac{1}{7}$th.

* This does not apply to ambulance waggons, &c., accompanying regiments.

In preparing boats to act as pontoons, the baulks or road-bearers should not be allowed to bring the weight on the gunnels. They should rest on a beam (called a saddle) placed in the centre of the boat with a bearing on the keel.

Casks bear grounding on mud better than boats, few of which will stand the weight of a movable load when grounded.

With open boats, ordinary loads, as infantry in fours crowded, or field guns should not immerse the vessel deeper than within 1 ft. of the gunnel. With closed vessels $\frac{9}{10}$ths of the actual buoyancy may be considered available. The waterway between the piers should never be less, and should if possible be more, than the width of the piers.

The piers or supports of a floating bridge should be at least twice as long as the width of the roadway, unless the buoyancy is much in excess of that required.

THE FOLLOWING ARE THE WEIGHTS BROUGHT ON A BRIDGE BY THE PASSAGE OF TROOPS, &c.:—

One hundred men in fours in marching order (200 lbs. per man) occupy 90 running feet of bridge, and cause a load of 222 lbs. *per lineal foot of roadway.*

The same when crowded by a check in front, cause a load of 560 lbs. *per lineal foot.*

The same when crowded in a disorganised mass, cause *a weight of* 84 lbs. *per square foot of roadway.*

Cavalry in double file, each man and horse weighing about 1400 lbs., and occupying 12 feet of bridge, cause a load of about 233 lbs. *per lineal foot of roadway.*

Cavalry, when crowded by a check, gives a load of *about* 350 lbs. *per lineal foot of roadway.*

When artillery cross a bridge the weight is not equally distributed.

Our 16-pr. field-gun weighs 4728 lbs., and the centres of the wheels are 9 ft. apart, giving a load *per lineal foot of* 525 lbs.

A 40-pr. Armstrong gun, weighing 79 cwt. 1 qr. 7 lbs., and having its wheels 10 ft. apart, from centre to centre, gives a weight of 888 lbs. *per lineal foot.*

Unarmed men, crowded, averaging 145 lbs. per man, gives a weight of 110 lbs. *per square foot of roadway*, which is the heaviest weight that can be brought on a bridge under any circumstances in the field.

Elephants cannot be made to crowd together. When loaded with baggage an elephant occupies a space of about 99 square ft. (11 ft. by 9 ft). Their average weight (including their load of 13 cwt.) may be taken as 72 cwt., of which $\frac{4}{10}$ths is borne on the hind legs, which are 6½ ft. from the fore legs. In calculation it must be assumed that a weight of 44 cwt. may be brought on to one foot of an elephant.

Elephants unloaded occupy a space of about 55 square ft. (11 ft. by 5 ft.). The weight of an elephant harnessed into the shafts of a gun may be taken at 66 cwt.; his hind legs are 5½ ft., and those of the leader 22½ ft. from the axle of the limber.

Camels, when loaded with baggage, occupy a space of about 70 square ft. (10 ft. by 7 ft.). Their average weight (including their load of 4½ cwt.) may be taken as 15 cwt., of which ⅓rd is borne on the hind legs, which are about 4½ ft. from their fore legs. It must be assumed that a weight of 10 cwt. may be brought on to one foot of a camel.

Pack bullocks, such as are used in India, when loaded with baggage occupy a space of about 13½ square ft. (5 ft. by 2¾ ft.). Their average weight (including their load of 1½ cwt.) may be taken as 5½ cwt., of which ⅓rd is borne on the hind legs, which are about 3½ ft. from their fore legs. In calculation it must be assumed that a weight of 3½ cwt. may be brought on to one foot of a pack bullock.

Cattle for Commissariat purposes may be assumed to weigh each about 9 cwt., and when crowded, occupy a space of about 9 square ft. of standing room.

To each running foot of bridge must be added about 100 lbs. as weight of superstructure.

When troops are crossing suspension, military, spar, and floating bridges, the following rules should be attended to :—

Infantry must break step, and all music cease; and files or sections must not be closed up.

Cavalry will, as a rule, cross in file, but never faster than a walk.

Wheel carriages of all kinds, including field artillery and artillery of position, up to the 40-pr. rifled B.L., with trained horses, are to cross fully horsed; with unsteady horses, carriages must be passed over by hand. Taking out the lead horses and crossing with the wheel horses only is strictly forbidden.

Halting on a bridge is to be avoided. If it be absolutely necessary to halt on a pontoon bridge, gun wheels must rest as near as possible midway between two boats. Artillery should cross at increased intervals. If the bridge sways so as to become very unsteady, the column must be halted, and not allowed to resume its movement till the swaying has ceased.

If heavy guns or traction engines have to be passed over pontoon bridges, special arrangements will be adopted.

These rules apply to all suspension, military, spar, and floating bridges.

Officers will incur grave responsibility if they cross a bridge otherwise than in the way recommended by the engineer officer in charge.

Cattle being liable to fright, should be driven over in small numbers at a time, the bridge being given up to them entirely for the time of their passage.

THE PONTOONS used hitherto in our service are of two kinds, known as Blanshard's large pontoon and Blanshard's infantry pontoons. Both are cylinders of tin. The former is 19 ft. 2 in. long and 2 ft. 8 in. in diameter, and has hemispherical ends of 1 ft. 6½ in., making the total length of pontoon 22 ft. 3 in.; it weighs 476 lbs.; the displacement is 6735 lbs. The weight of superstructure for one bay is 986 lbs., 1023 lbs., or 1120 lbs., according as the interval between pontoons are either 8 ft. 4 in., 10 ft. 5 in., or 12 ft. 6 in., and the respective power of support per running foot of

bridge is 581 lbs., 456 lbs., or 373 lbs. Two pontoons with their allotted superstructure, form a raft. A raft with superstructure for it, and the bay between it and another raft, is carried on one waggon (1560 lbs.); the whole weighing 4800 lbs., intended to be drawn by four horses, but requiring at least six. The infantry pontoon is a tin cylinder of 1 ft. 7 in. in diameter; 12 ft. long with conical ends, making the total length 15 ft. 5 in.; weight 141 lbs., displacement, 1640 lbs.; the superstructure for one bay 200 lbs., making the supporting power of each pontoon 1300 lbs., or 200 lbs. per running foot of bridge. Five pontoons, with superstructure for five bays, are carried on one waggon (1008 lbs.), the total weight of which with load is 2976 lbs. For the passage of artillery drawn by horses the roadway of bridges should be 9 ft. wide.

The pontoons which are henceforth to be used in our army are in shape like scows, and measure 22 ft. 6 in. over all in length, 4 ft. in width, and 2 ft. 4 in. in depth. They are made of Clarkson's material on light wooden frames: each weighs 850 lbs. They can be used singly as boats, and will carry 25 men each, with arms, pack, &c., &c. The new pontoon train is in units of 100 yds. of floating bridge, and carries trestles for each end so as to make a bridge over a river of 120 yds. wide. The establishment of a pontoon troop is given at page 32.

Each pontoon waggon carries one pontoon and 5 yds. of bridge. The boat waggon carries 1 boat and 5 yds. of bridge. The spare waggons carries 5 yds. of bridge, but no boat or pontoon. Each trestle waggon carries 2 trestles and 5 yds. of bridge. An opening of 15 yds. in width can be spanned by the trestles without putting a boat or pontoon into the water. Each waggon on service will be drawn by 6 horses. The pontooniers can be mounted in the boats on the waggons, so that the train can, when necessary, keep up with cavalry on forced marches. All the waggons are on springs. The weight of load in each pontoon waggon is 2454 lbs., exclusive of the two pontooniers (say 400 lbs.). The waggon itself weighs 1590 lbs. The total weight behind team (the pontooniers included) is therefore 4444 lbs. No light bridge equipment has yet been decided upon, as many thought that with our new pontoons it would not be required; it is now generally accepted that a light equipment to enable advanced guards to cross narrow streams and canals is urgently required.

FLOATING BRIDGES can always be easily made over rivers when either boats or casks are to be had. An officer will know at once from the above data the amount of floating power his bridge requires; to it he will add the weight of the superstructure (generally about 100 lbs. for each foot of bridge), multiply the sum by the number of feet he intends the piers to be from centre to centre, and divide by the floating power of a cask, boat, log of wood, or whatever is to afford the floating power; the quotient will be

the number of them required for each pier. For instance, a number of commissariat tierces are available; each contains 37 gallons, and as a gallon of distilled water weighs 10 lbs., the displacement may be put down at 370 lbs., deduct from it 58 lbs., the weight of the cask, and the result (312 lbs.) will be the floating power of each; allowing $\frac{1}{4}$th surplus buoyancy, each cask can support in bridge 278 lbs.

The bridge to be fit for the passage of field artillery must have a floating power of 525 lbs., per running foot; allowing 100 lbs. a foot for superstructure, the floating power required is, say, 625 lbs. a running foot. It is decided to make each pier of 20 casks placed in two rows, which will give it a length of about 21 ft.; the total supporting power of each pier will then be 5560 lbs.; divide that quantity by 625, and it gives 8 ft. 10 in., the distance that each pier must be from the other, measuring from centre to centre.

CASK RAFTS AND BRIDGES.—The buoyancy of casks is ascertained by the following rule. Add together the area of the head, the area of a circle on the bung diameter, and the geometrical means between those areas: multiply the sum by one-third of the length of the cask (all these measurements to be in inches), and the result is the number of cubic inches of water displaced; divide by 1728, and it is in cubic feet; multiply that by 62·5, and the result is the weight in lbs. of the water displaced. For example, a cask whose bung diameter is 25 in., head diameter 21 in., and length $31\frac{1}{2}$ in.; the area of the head is $21^2 \times \cdot 7854$, that of the bung section $25^2 \times \cdot 7854$, and the geometrical mean between those areas is $21 \times 25 \times \cdot 7854$. The formula will therefore be $\frac{(21^2+25^2+(21\times25))\cdot7854\times31\cdot5}{3} = \frac{(441+625+525)\times\cdot7854\times31\cdot5}{3} =$ $\frac{1591\times24\cdot74}{3} = 13117\cdot163$ cubic in. of water displaced, and $\frac{13117\cdot163\times62\cdot5}{1728}$ $= 474$ lbs. weight of water displaced. In many instances the number of gallons that a cask holds is known; the buoyancy is then easily ascertained by multiplying that number by 10 (the number of lbs. weight in a gallon of water). In calculating the buoyancy of any floating bridge the weight of the superstructure must be accurately estimated, for with rough green material it will easily go up as far as 200 lbs. to the running foot. It is seldom that one can obtain on service sufficient casks for the formation of a bridge across a wide river, but they are excellent adjuncts when the number of pontoons or boats is insufficient; they form admirable rafts, and are so easily and safely transported that for all wild expeditions, where transport is a matter of great difficulty, they are very

commonly used by us. The larger the cask the better, as the weight will be smaller in proportion to the buoyancy than when small ones are used. Piers of casks should never be less than 20 ft. in length. They are formed in two ways; either placing the casks on their sides or on end, the casks fastened together either by lashing, or by spikes of wood or iron. When-

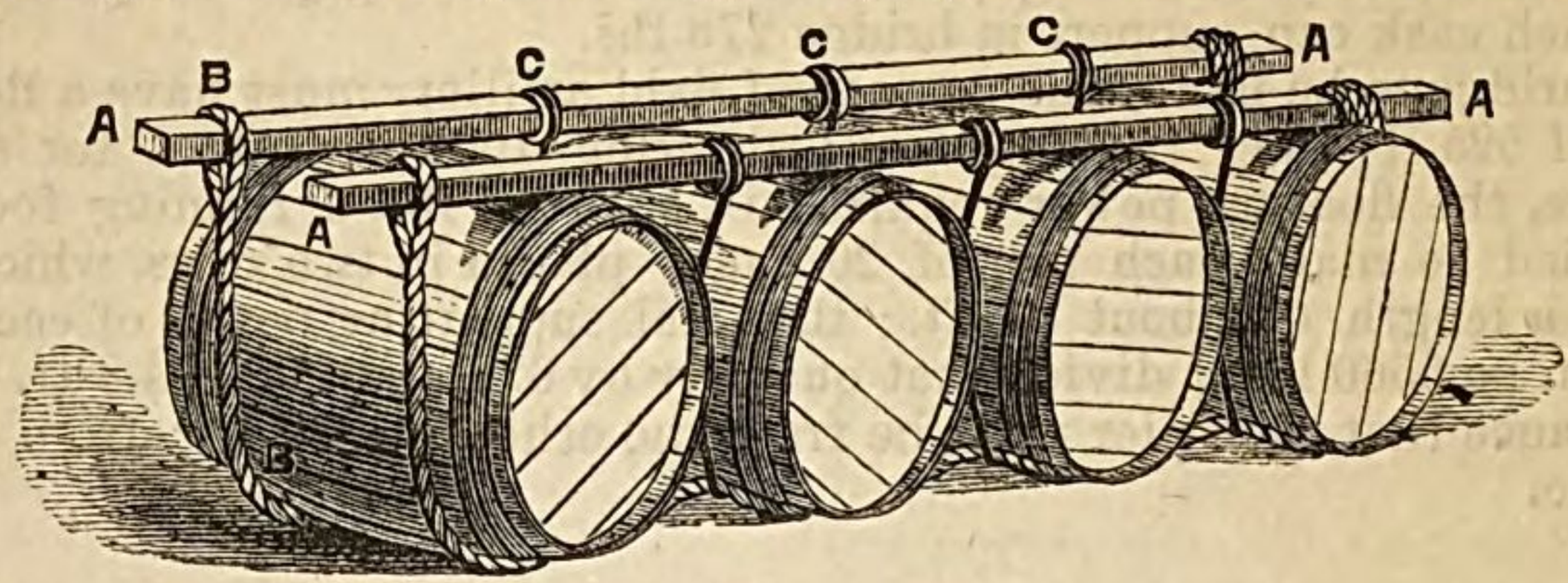


Fig. 25.

ever rope is to be had the former should be used, as it is the best. For the first method, the casks are placed in a row side by side with the bungs up, two pieces of wood (about 5 in.×5 in.) called gunnels (A A,) are laid along them about 4 in. from each end. Slings (B, B), of $2\frac{1}{2}$-in. rope are passed under the cask from end to end of the gunnels; one end of the sling should have an eye-splice, or should have a loop large enough for the end of the gunnel to pass through it (to be made as shown by knot 5 at the end of this article). The other end, being drawn as tight as possible, is given a round turn over the gunnel and fastened by two hitches, as shown in knot

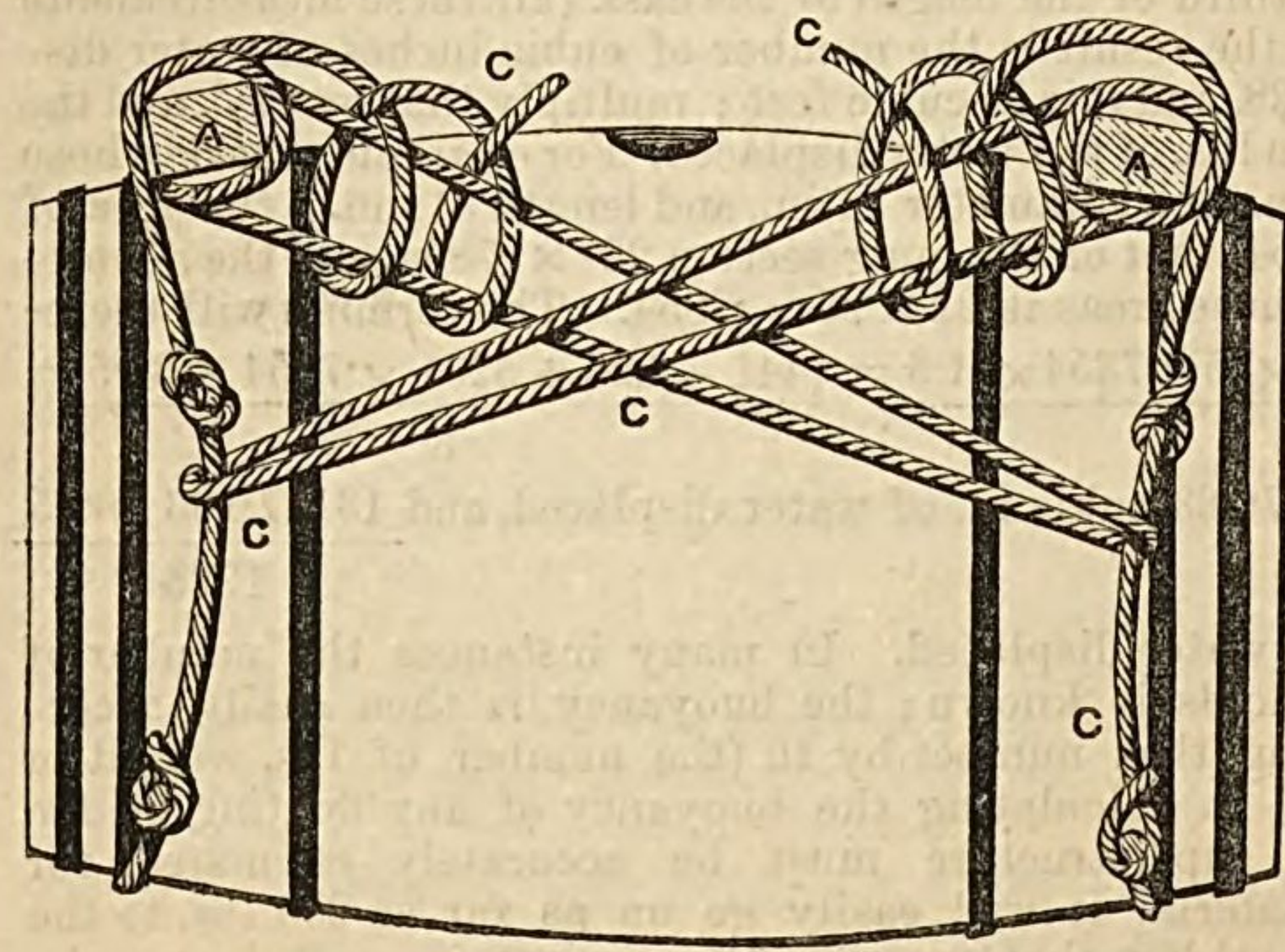


Fig. 26.

7. Between every cask there are lashings called braces (C,C,C) of $1\frac{1}{2}$ in. rope, 18 ft. long: there should be an eye-splice at one of the ends, by passing the other end of the brace through which it is fastened to the sling. If there is no time to make this eye-splice, the brace must be fastened to the sling by a common running knot, taking care to have a common single knot on the end before making the running one. At about 1 ft. 9 in. from the sling a common single knot is to be made. The accompanying sketches show how these braces (C, C, C) are then applied to bind together the gunnels (A, A) casks, and slings (B, B).

When enough rope is not to be had, the gunnels must be nailed or spiked to the barrels, poles or scantling being placed below the barrels in the same way as the gunnels are above them, also spiked into the casks; the ends allowed to project a little, and fastened with rope to the ends of the gunnels above. The use of spikes or nails in floating bridges is always to be avoided if possible, as they do not admit of sufficient play. The hoops should be frequently examined to prevent leakage, and small tin pumps should be made to go through the bung holes to pump out all leakages.

It frequently happens that large numbers of casks are to be had from the commissariat, the heads of which have been destroyed, used as firewood, &c. These have no bungs, and can be used for rafts or piers of bridges by placing them on end in rows side by side, and nailing them together where they touch, clinching the nails well; stout poles or pieces of scantling should be nailed along between the rows of casks both above and below, their ends projecting beyond the raft and tied together by ropes, or fastened by planks nailed over them. Greater floating power can be obtained from the same sized raft when the barrels are thus placed on end than sideways; but if the water is rough, and considerable immersion is expected, it is advisable to nail planks or canvas over the open tops, to prevent the water washing over. When more than one row of casks are used for a pier, the baulks of the roadway should rest on a sleeper [notched to receive them] placed along the centre of the pier, and supported on short cross-pieces uniting the gunnels of each row of casks. This should be carefully attended to in constructing bridges of boats, for if, as the writer saw done upon an important occasion, the baulks supporting the roadway rest on the gunnels, the bridge will be useless for heavy weights, and dangerous for the passage of even single horsemen.

BOAT BRIDGES.—The boats available for rafts or bridges should be classed according to their dimensions, and their floating power determined. The tonnage of vessels is found as follows: L = length of keel between perpendiculars in feet—the breadth; B = breadth in feet of broadest part.

The tonnage $= \frac{L \times B \times \frac{1}{2} B}{83{\cdot}55}$. This only applies to large-decked vessels.

For small craft and open boats, it is better to calculate the area of several sections to obtain the cubic content in feet, upon multiplying which by 62·5 you have the number of lbs. of water displaced.

If you can put the boat in the water the process is simple, as it is easy to calculate the volume of that part between the water line when the boat is empty and the line to which it can be safely sunk when loaded, by multiplying together the distance between those two lines, the length and the mean breadth, which will give the cubic contents of the available buoyancy in cubic feet.

When the boats are of several sizes, the largest should be used where the current is swiftest, so as to allow having the greatest space possible between the boats there; it is advisable also to have the first and last boats large ones, as they ought to be less liable to great immersion for convenience in getting heavy carriages off and on them, to and from the banks or fixed portions of the bridge. In laying the flooring, the centre baulk of the roadway should be a little abaft the centre of flotation of the boats, so that their heads may rise a little to the current. In the passage of rivers by floating bridges, it is almost always necessary to construct the shallow portions nearest the bank with trestles, so that the casks or boats may have sufficient depth of water.

RAFTS OF TIMBER.—In a wooded country rafts are easily constructed, and can be safely used where the current does not exceed 6′ per second, say four miles an hour. The size and description of the timber must determine the number of layers there should be. They must be put together in the water, each layer being placed at right angles over the one beneath it, and holes 2 in. in diameter bored at the points where they cross; the holes are bored through all the upper layers, and halfway down into the timbers of the lower ones. Pins of some hard wood cut to fit these holes, each having a wedge applied to a split in the end, are then passed through these holes and hammered, so that the wedges on reaching the bottom of the holes are forced into the stake, fixing it securely.

If timber used in rafts is not tarred or well coated with paint or varnish at the ends or where branches have been cut off, its weight will be increased about $\frac{1}{6}$th after a few days' immersion.

The cubic contents of round timber is found as follows: G is the mean between the girths at both ends in feet and decimals; L is the length of log in same; $L\ (G^2 \times \cdot 07958)$ = cubic contents in feet.

The weight per cub. ft. of the following descriptions of timber is—

—		Cubic Feet Green.	Loss per 100 lbs. when Dry.
		lbs.	lbs.
Elm		58·5	37·6
Oak	from	58·74	33·15
	to	69·5	31·1
Spanish Chestnut		54·6	30·6
Walnut		57·5	33
Poplar of Provence		50·96	..
Acacia		51·25	9
Larch	from	42·06	26
	to	53·68	28·5
Spruce		50·2	42
Pine		51·08	47·3
Fir (white pine)		33·2	24
Poplar (American)		49·68	38·2

Any of these weights deducted from 62·5 (the weight in lbs. of a cub. ft. of water) gives the buoyancy of a cub. ft. of that timber. The floating power of a log is therefore to be ascertained thus. A spruce log is 30 ft. long, and has a mean girth of 2·75 ft.: $30\ (2{\cdot}75^2 \times {\cdot}07958) = 30 \times {\cdot}6 = 18 =$ number of cub. ft. in log. The weight of a cub. ft. of that timber when cut green is 50·2 lbs., which, deducted from 62·5, gives it a buoyancy per cub. ft. of 12·3 lbs., and that result multiplied by 30 (length of log. in ft.) $= 369 =$ its total floating power.

The timber for rafts should be floated, if possible, to the spot required. Ammunition waggons, with the boxes taken off, do well for carrying logs when required. It will always be a question of time whether in wooded countries it is most advisable to form bridges of logs, which require an immense amount of material, or of rough punts, which require comparatively but little material, but more time to make them.

To construct a rough Punt.—'Fell 7 trees of about 16 in. in diameter, and cut off 18 ft. length from each. Lay 5 of them on any level spot, parallel to each other, at 3 ft. asunder, and level their upper surfaces; plank them throughout. If nails are not at hand, use wooden pegs.' Planks can generally be obtained by ripping up the floors of houses. Caulk well, 'if tow or oakum are not to be found, rushes, or even moss, with tallow and bees-wax will do.' As soon as the platform is caulked, turn it over on a couple of rollers to facilitate launching, and bolt down the two remaining trees over the ends of those forming the platform. Plank the sides and ends of the vessel, taking care that the bottom planks overlay the sides. The punt thus

formed would be about 34 in. deep and 18 ft. square; if built of lumber, weighing 37·5 lbs. to the cub. ft., its total weight, including spikes and nails, would be about 10·200 lbs., and it would give a buoyancy of 35·000 lbs., allowing for its weight, and $\frac{1}{4}$th of its buoyancy as surplus.

A good waterproof composition for cotton or canvas is: bees-wax, tallow, and pitch, in proportion of 2 parts by weight of bees-wax, 2 of tallow, and 8 of pitch; melted over a slow fire, not allowed to boil, and kept stirred.

SUBSTITUTES FOR ANCHORS.—A wheel with the tire and felloes taken off, having small triangular pieces of hard wood nailed to the ends of the spokes, and a good strong spar of tough wood on the axle forming the shank, is a fair substitute for an anchor; one wheel should be reversed when two are used. Stones must be packed round the shank by means of wicker-work. A harrow well laden with stones answers fairly. When time and circumstances are favourable, piles can be driven obliquely above the bridge to hold the cables; 2, 3, or 4 should be driven in one behind the other, according to the force of the stream; a strut should run from the foot of each to the head of that in front of it, which should be notched to hold it; 2 or 3 pickaxes set upon the same shank, laden with stones, make admirable grapnels for small craft, particularly if an iron crowbar can be substituted for their wooden handles. A barrel with the head removed and stout pointed stakes driven at right angles to one another through holes bored in the sides near the bottom, and projecting from them about a foot, having the cable fastened round these stakes where they cross inside the barrel, makes a good anchor; the barrel should be filled with stones, and have the head replaced or nailed on, to keep them in. Any strong box may be treated in the same manner. A good anchor can be easily formed thus: Take two stout poles 6 ft. long, pointed at the ends, cross them in the centre at right angles, and lash them firmly to the end of the cable; build up on this foundation a cone of basket-work with a diameter of 3 ft. and a height of about 4 ft., filling it with stones or gravel as you proceed; at the apex where the cable passes out bind all together. When regular iron anchors are to be had they should weigh from 50 to 100 lbs.

THE LENGTH OF CABLE should always be at least ten times the depth of water in which the boat, &c., is anchored. The anchor should be taken out on a raft or boat and dropped over at the required place.

If rope is plentiful, breast-lines at an angle of not less than 45° with the bridge should be passed from the rafts to secure objects, such as trees, &c., on shore. If the current is rapid, or the river subject to flushes, too much care cannot be taken in securing floating bridges.

Hemp cables and ropes of all descriptions are distinguished by the number of inches in their circumference. When L is the length in fathoms, and C the circumference, the weight in lbs. $= (L \times C^2)\ \cdot 26$. Their breaking

strain in tons = $c^2 \times \cdot 28$ for hempen ropes, and for common cables = $c^2 \times \cdot 2$. The safe working strain in cwts. is the product multiplied by 3.

For nearly all floating bridges it is necessary to construct piers from each bank, reaching out some distance into the water. To do so, the superstructure of the bridge is simply laid upon horses or trestles; the former have 2 legs, the latter 4 or 6.

Trestle Bridges.—The site having been carefully selected, when any other than a floating bridge is to be constructed, the first necessity is to draw on paper a minute section of the river, noting carefully the nature of the bottom.

In streams not subject to freshets, or where the current is slow, the most practical and simplest form of bridge is that laid on trestles. The distance they can be safely placed apart depends upon the nature and dimensions of the timber and upon the sort and size of trestle to be used. From 12 to 16 ft. is the greatest distance they can be placed apart with safety even in sluggish streams; and their maximum height should not exceed from 20 to 25 ft.

This distance having been determined upon, the exact position of each trestle can be marked on the section, and the length of the legs of each be ascertained.

When more than one tier of trestles is to be used, the legs of the lower ones should conform to the depth of the river or valley, so that when in position the caps shall all be in the same horizontal plane. All the trestles of the other tiers may then be made of equal dimensions one with another, which will expedite the work.

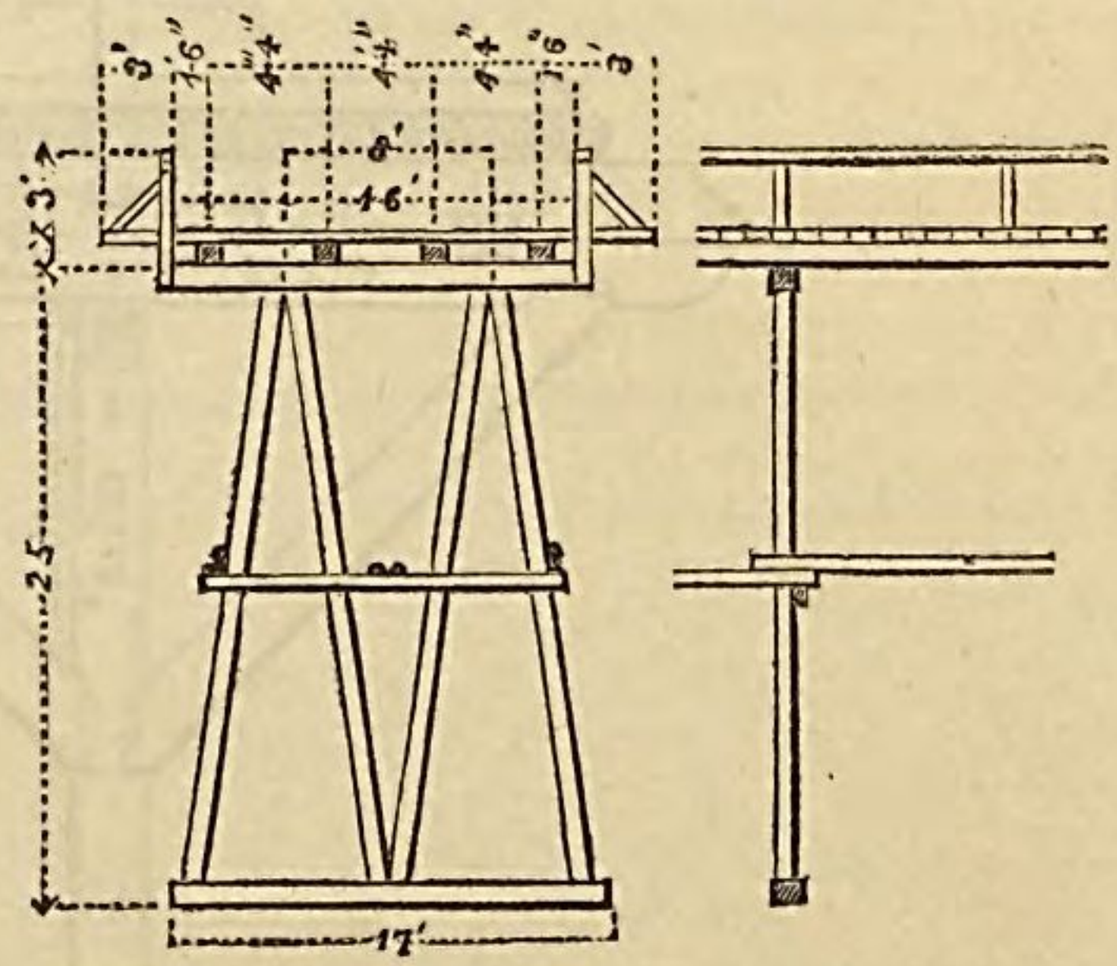


Fig. 27.

Trestles can be made from rough round timber as well as from square beams. The straightest trees should be selected, for which reason all the various pine species are the best. For a trestle 25 ft. high, the legs should not be less at their smallest end than 9 in. in diameter. The caps to give a clear width of 16 ft. of roadway should be 16 ft. long and about 12 in. by 12 in.; they should be squared. They are secured to the legs by treenails of hard wood 2 in. in diameter. The sills should be 17 ft. long and flatted on both sides; they are secured to the legs in a similar manner, which is preferable to mortices

and tenons. The longitudinal and transverse braces should be 5 or 6 in. in diameter, and can be secured by iron spikes or treenails.

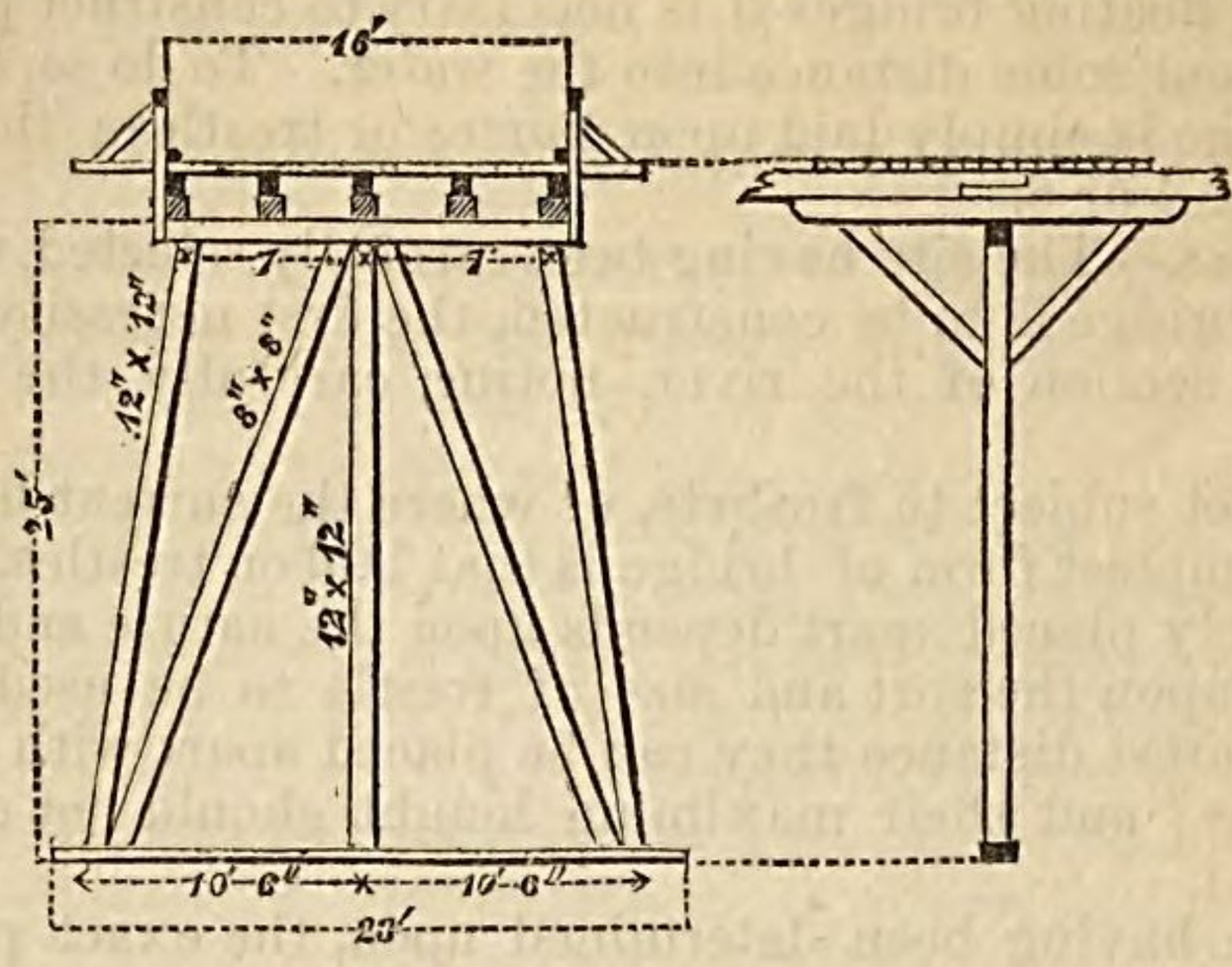


Fig. 28.

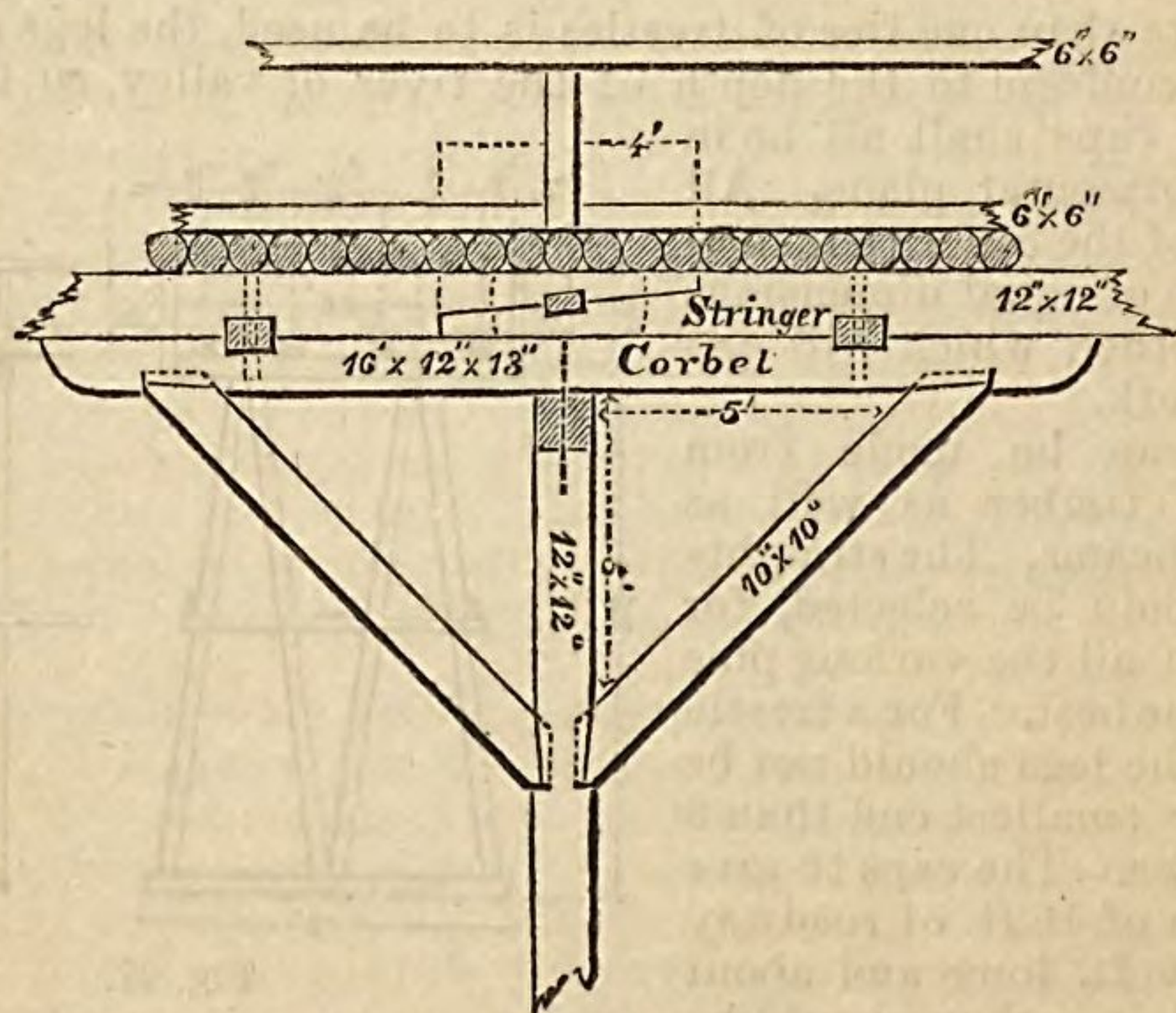


Fig. 29.

The trestles shown in Fig. 27, if made of timber that weighed 38 lbs. to the cubic foot, would weigh about 2530 lbs. It is one that was very

commonly used by the Americans in reconstructing their railroads during the war, and was in some instances placed in three tiers one over the other to a height of 70 ft.

When the bottom is rocky and uneven the sills must be dispensed with; in place of these, strong transverse braces must be fastened on each side of the legs as near the bottom as its unevenness will permit, the legs being cut so that they shall rest securely upon the bottom. If the bridge is only required for ordinary military purposes, and not for a railroad, trestles can be placed 30 ft. apart by providing them with corbels, as shown in sketch, using 5 stringers and 5 legs instead of 4; see Fig. 28 and Fig. 29.

The first gives a section and side elevation, the latter shows the corbels on a larger scale.

The four-legged trestle shown in Fig. 30, is one very commonly used in Europe, the legs, caps, braces, &c., being made of the same sized material as in the trestle already described. If 25 ft. high and with a cap 16 ft. long it would weigh 3265 lbs. if made of pine that weighed 38 lbs. to the cubic foot. They should be placed from 12 to 16 ft. apart. Fig. 30 is a front and

Fig. 30.

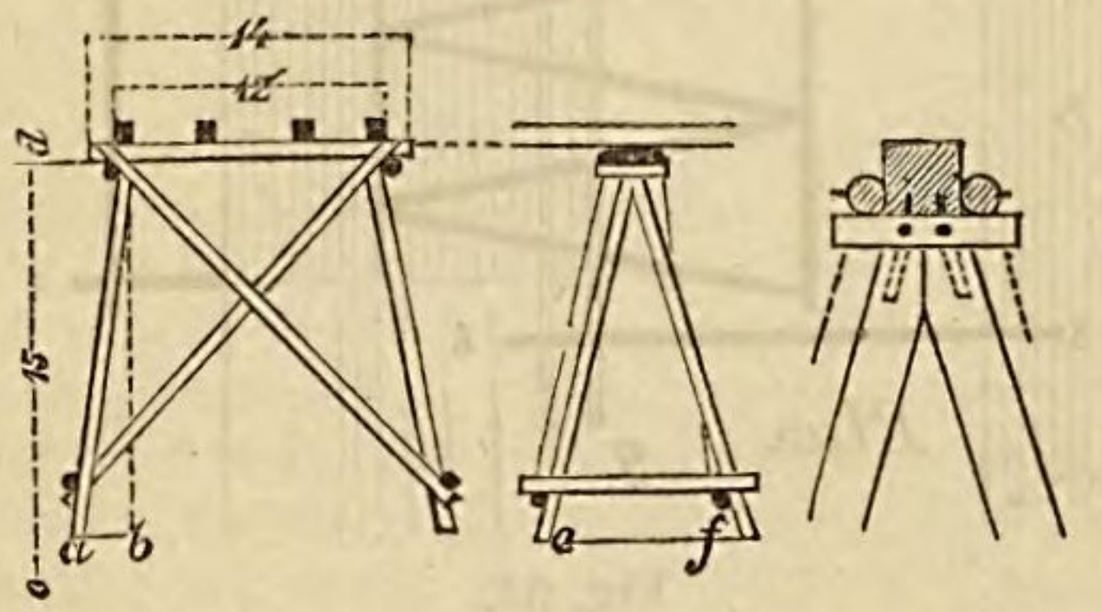


Fig. 31.

side elevation; Fig. 31 is on a larger scale, showing the cap piece in profile, $ab = \frac{cd}{6}$; and $ef = \frac{cd}{2}$. These proportions should not be departed from.

Trestles can only be used in deep water—particularly if there is much current—by loading them below with stones or other weights. The simplest method of applying these weights is by means of basket or light crib work being constructed round the bottom of each leg, or, when four-legged trestles are used, by surrounding the lower part of the space included within the four legs with crib work, and filling it with stones.

The mode of lowering these trestles into position is shown in Fig. 32, in next page. A is a boat or raft about 6 ft. wide and 25 ft. long, kept temporarily in position by two poles, *s s*, stretching from it to the bank where they rest upon a pole, *x x*, about 5 in. in diameter, to which they are pinned or lashed at 21 ft. apart, so as to allow of the trestle being shoved out between them.

The distance they are to be apart will of course depend upon the extreme breadth of the trestle to be placed in position.

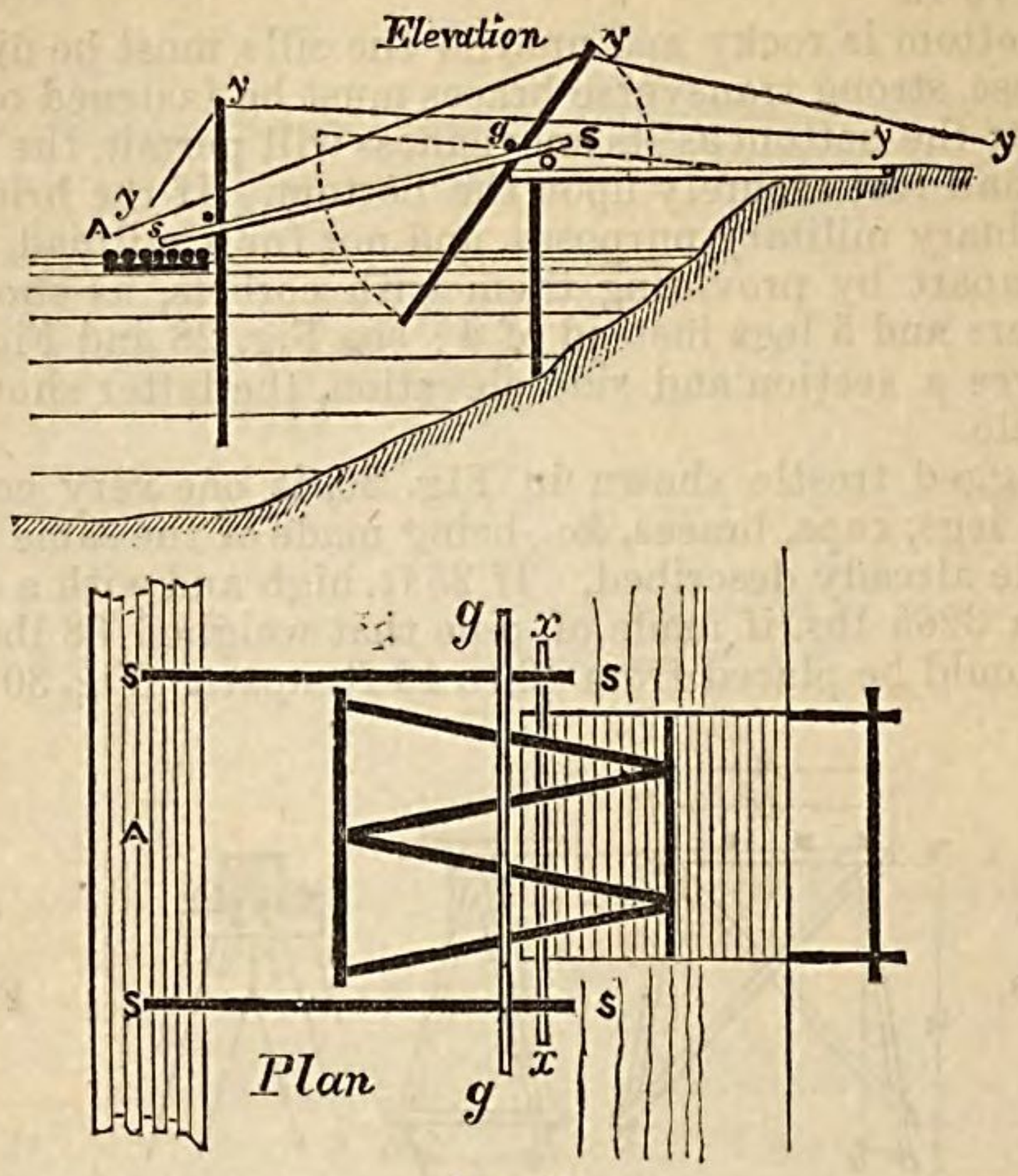


Fig. 32.

The trestle nearest the bank being usually a small one in shallow water we will suppose it placed, and the roadway finished out to it. The trestle to be fixed next, having been put together on the bank, is pushed out on rollers, legs foremost, to the end of the made portion of bridge, between the poles resting on the boat, a pole, *g g*, about 5 in. by 5 in., and 25 ft. long, is temporarily lashed to the inside of the outer legs at a distance from the cap of about a third of the trestle's height, a guy rope, *y y*, is fastened to its middle by a clove hitch in the cap, one end being held on shore, the other on the boat. The trestle is shoved out so that the ends of *g g* shall rest on the poles *e f*, *e f*, at each side until it begins to topple over, when, by means of the guy rope, it is brought into a perpendicular position, as shown in sketch. It can thus be hauled out close to the boat by a rope passed round *g g*, and lowered until the legs rest on the bottom, by gradually loosening off the lashing fastening it to the pole *g g*, which will then be removed for use with the next trestle.

If it is found that the bottom is so uneven that the trestle is not vertical, the trestle should be swayed backwards and forwards by means of the guy ropes while it rests upon the leg which is too long; this will make a hole for it, and cause it to sink as far as required, if the bottom be of sand or gravel.

The roadway is supported by four stringers, at least 12 in. in diameter; they should be flatted underneath where they rest on the caps of the trestles. If the spans are only short ones, it is advisable to make the stringers of timber long enough to extend over two; if this can be done, they should be laid so as to break joint as it were, and not all end over the same trestle. If possible, each stringer should form one continued piece, the ends being scarfed together, as shown in Fig. 29.

If planking is not to be had, the flooring of the roadway may be made of straight poles 6 in. in diameter and 16 ft. long, placed close together: at intervals of every 10 ft. one of these poles is 22 ft. long, projecting 3 ft. on each side, so that the uprights bearing the handrail may be strutted against it.

For rivers where the stream is rapid, or where freshets are to be expected, the bridges should be constructed on piers of crib work, if wood is plentiful.

A crib pier is made as follows: Say the pier is to be 18 ft. long and 4 ft. wide at top, and 15 ft. high, the sides having a slope of $\frac{1}{6}$th their height. The frame to form the base of such a pier would be 23 ft. long and 9 ft. wide [outside measurements]. To make this frame, lay down on the bank two logs or beams, A, A, 24 ft. long, and about 15 in. in diameter; place under them three round poles, B, B, B, of about 6 or 8 in. in diameter, to act as rollers for facilitating launching. These logs form the sides, and should be 7 ft. apart. Across their heads and centre place three others, C, C, C, 10 ft. long, and of the same thickness, having an interval between each of about $9\frac{1}{2}$ ft. These five logs are each notched 3 in. to receive one another, and pinned together with 2 in. treenails: Fig. 33 is a plan of the frame forming the base of the piece; Fig. 34 is a longitudinal section through pier when finished.

Cross-pieces of about 6 in. stuff are then pinned on at about $1\frac{1}{2}$ ft. apart, and covered with about 2 in. thickness of brushwood, which is kept in its place by a few heavy stones placed on it. If no stone is to be had, gravel or clay, inclosed in canvas bags—to be tarred if possible—may be used instead. A few courses of timber [if possible not less than 9 in. in diameter] to be then added on to the sides, ends, and centre brace, one over the other, all being scored on both sides to a depth of 2 in. and pinned to one another, care being taken that a batter of $\frac{1}{6}$ their height is given to the sides and ends.

The pier is then launched, and when in sufficiently deep water laden with stones so as to sink it nearly to a level with the upper course; a few other courses being then added, it will be towed to the position it is to

occupy, and sunk by adding more stone, completing the courses of timber until they reach the required height. The inclosed space should be filled with stone or filled sand-bags up to the highest water mark.

Fig. 34.

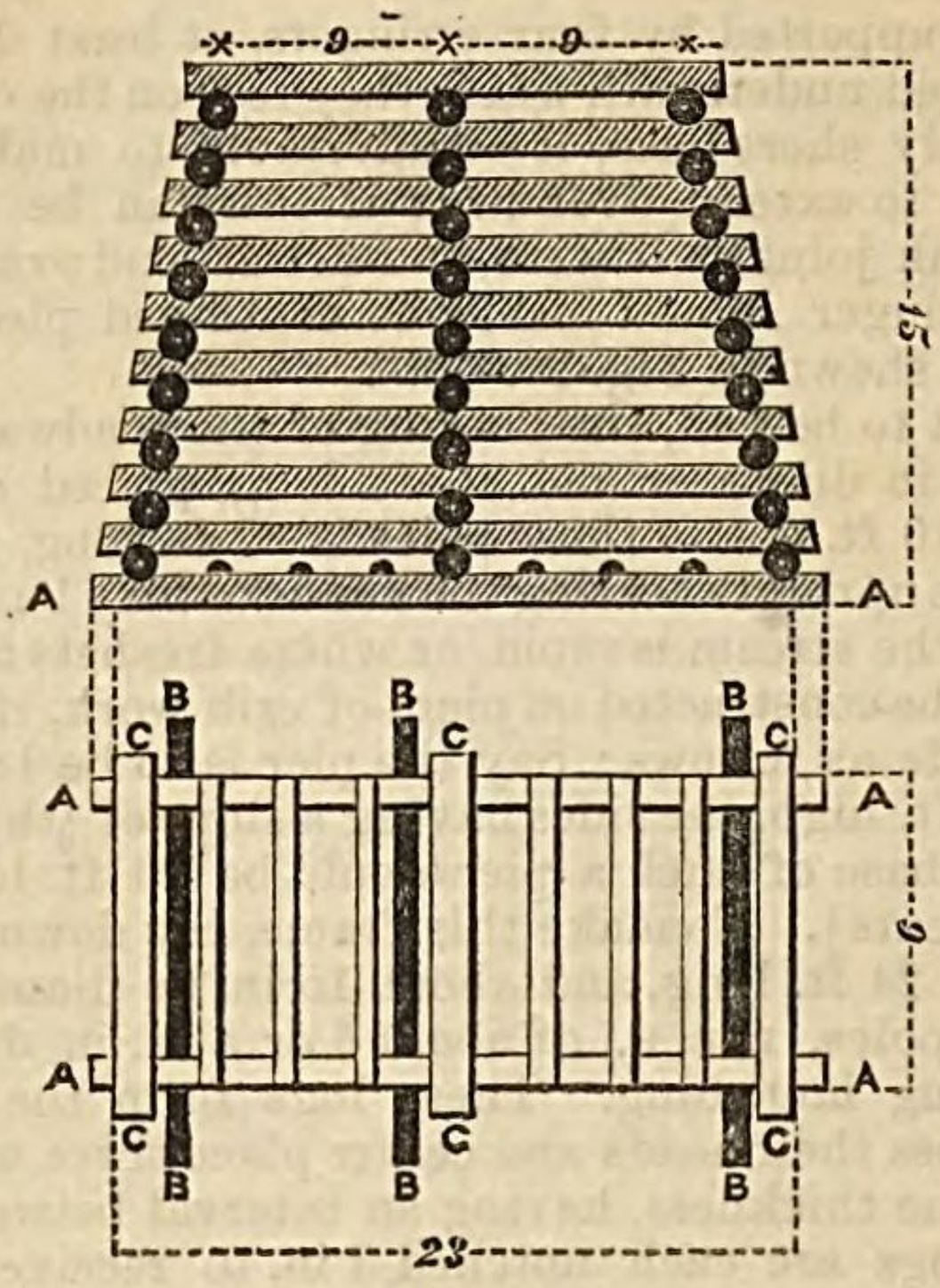


Fig. 33.

A pier of this description will bear any truss, or, if necessary, trestles, like those in Fig. 27 may be erected upon them. If stone or sand-bags are not to be had, clay or sand can be used by lining the inside with closely made hurdles, having a layer of moss or leaves next to them.

Wharves or piers can be made by a similar process in places where the action of waves would probably carry away trestles or piles, inclosing the space required for the pier with crib work and filling it in with stone.

All these plans are calculated for large bridges. Smaller ones with a clear width of 8 ft. of roadway can be made in a similar manner.

To place beams over a wide opening, such as that formed by the destruction of the arch in a bridge, or by the space between two crib piers, proceed as follows: Two light poles lashed together at about 3 ft. from their smallest ends are placed with their large ends resting on the

bottom, as shown in Fig. 35. In the triangle thus formed, the base should be $\frac{1}{3}$ the height. The beam is then shoved out a few feet through the fork thus formed, which is then hauled out over the opening by ropes; should it be impossible to get any one to the other side for this purpose, the beam being temporarily lashed to the fork can be pushed out, until its far end

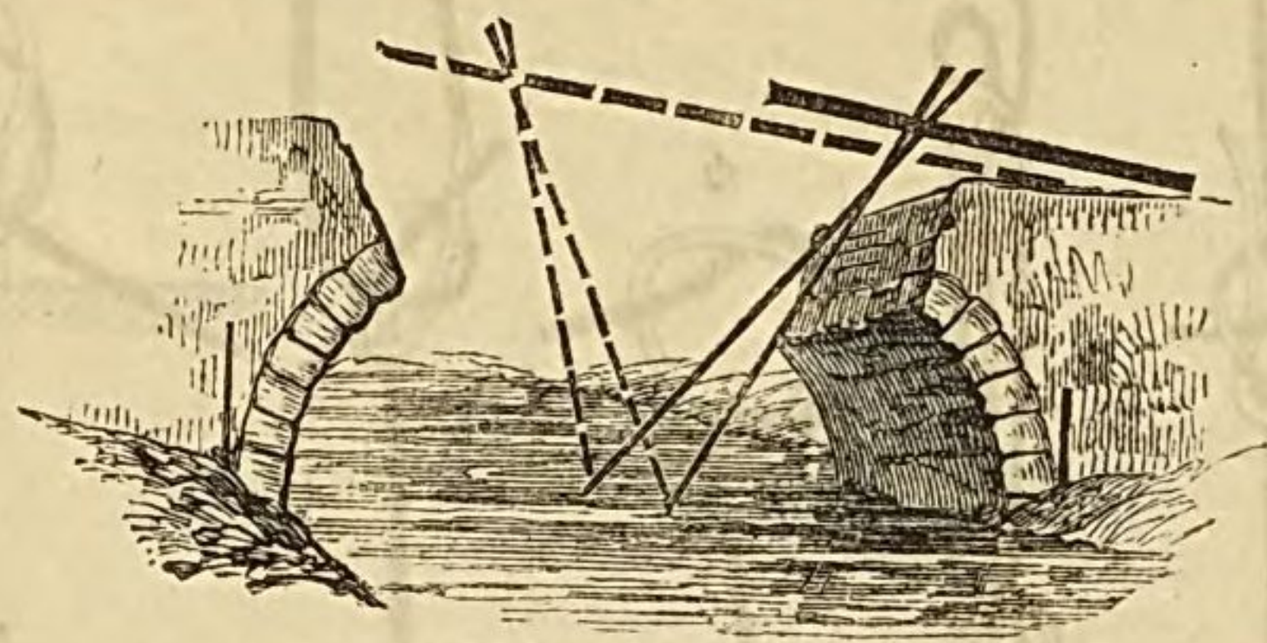


Fig. 35.

reaches the other side. The dotted lines in the sketch show the beam when nearly over. In this operation it is necessary that the breadth of the opening, and the height of the roadway over the bottom where the poles must rest, should be accurately computed, so that the beam may be lashed to the fork at the exact place which will insure the end reaching precisely the required spot.

A Table giving the specific gravity of various trees will be found in the article on "RAFTS."

In collecting materials for bridges, the following articles are the most important: tow, tar, pitch, bees-wax, canvas, paint, putty, white lead, varnish and all other materials for rendering boats waterproof; nails, spikes, crowbars, all iron work that will serve for anchors, rope, barrels, planking, beams, &c.

All officers should practise making the knots described below: a knowledge of their uses and being able to make them is essential in the construction of bridges.

No. 1.—*Reefknot*, used for lashings when two ropes, or the ends of one rope, have to be fastened so as to be easily undone.

No. 2.—*Single sheet bend*, for joining two ropes, or fastening a rope to a loop; it can be made much more secure by passing the lower rope twice round the loop.

No. 3.—*Sheepshank*, for shortening a rope when both ends are fastened.

No. 4.—*Timber hitch;* as long as strain is maintained it cannot give way, but immediately it is taken off it comes undone easily: it is useful in dragging material from place to place.

No. 5.—*Bowline*, invaluable in making a loop at the end of a line; it is difficult to undo; it is useful for making the drawloop of slip-nooses.

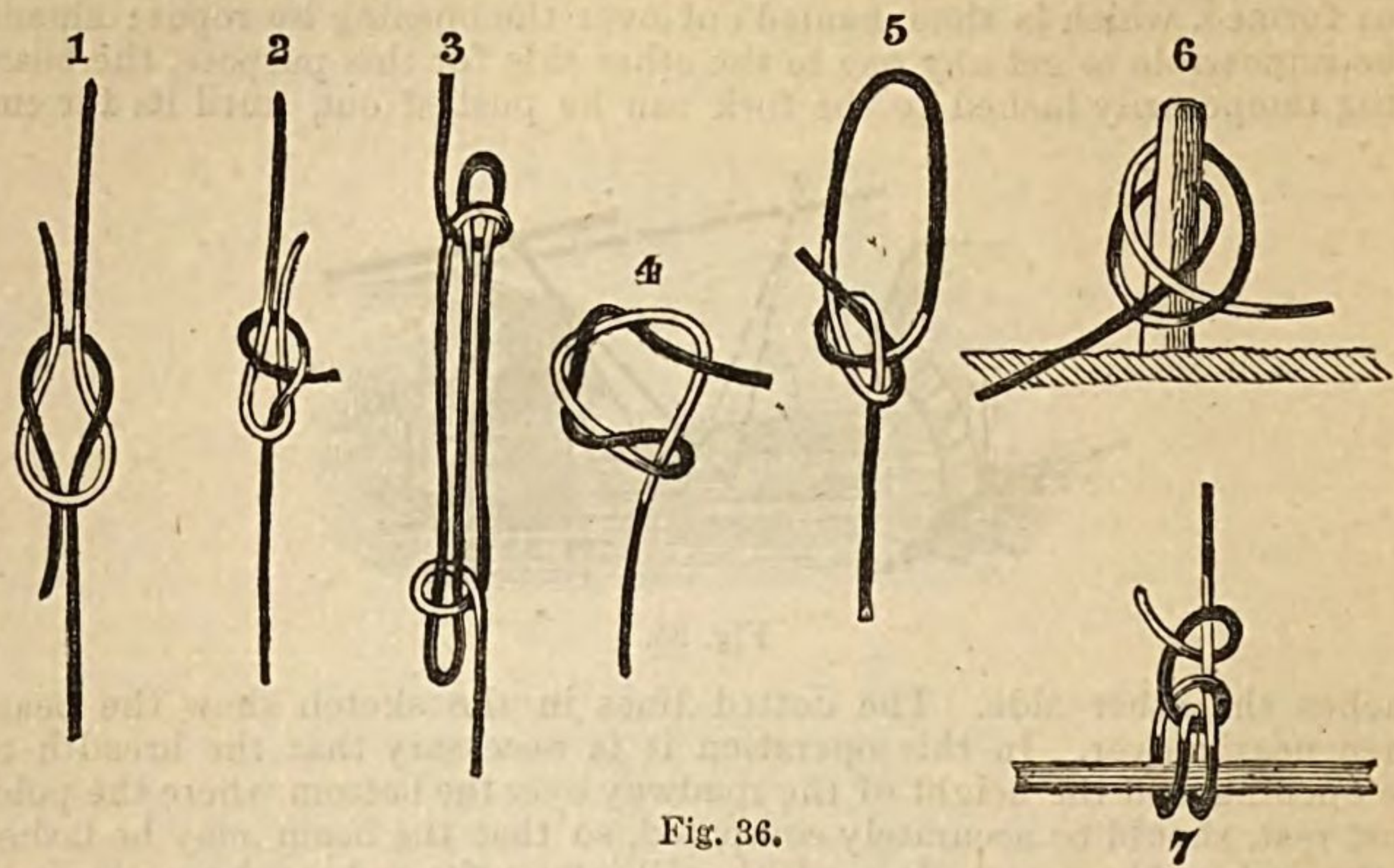


Fig. 36.

No. 6.—*Clovehitch*, for making fast breastlines and painters; it binds with great force.

No. 7.—*Fisherman's-bend*, for making fast cables to anchors or spars.

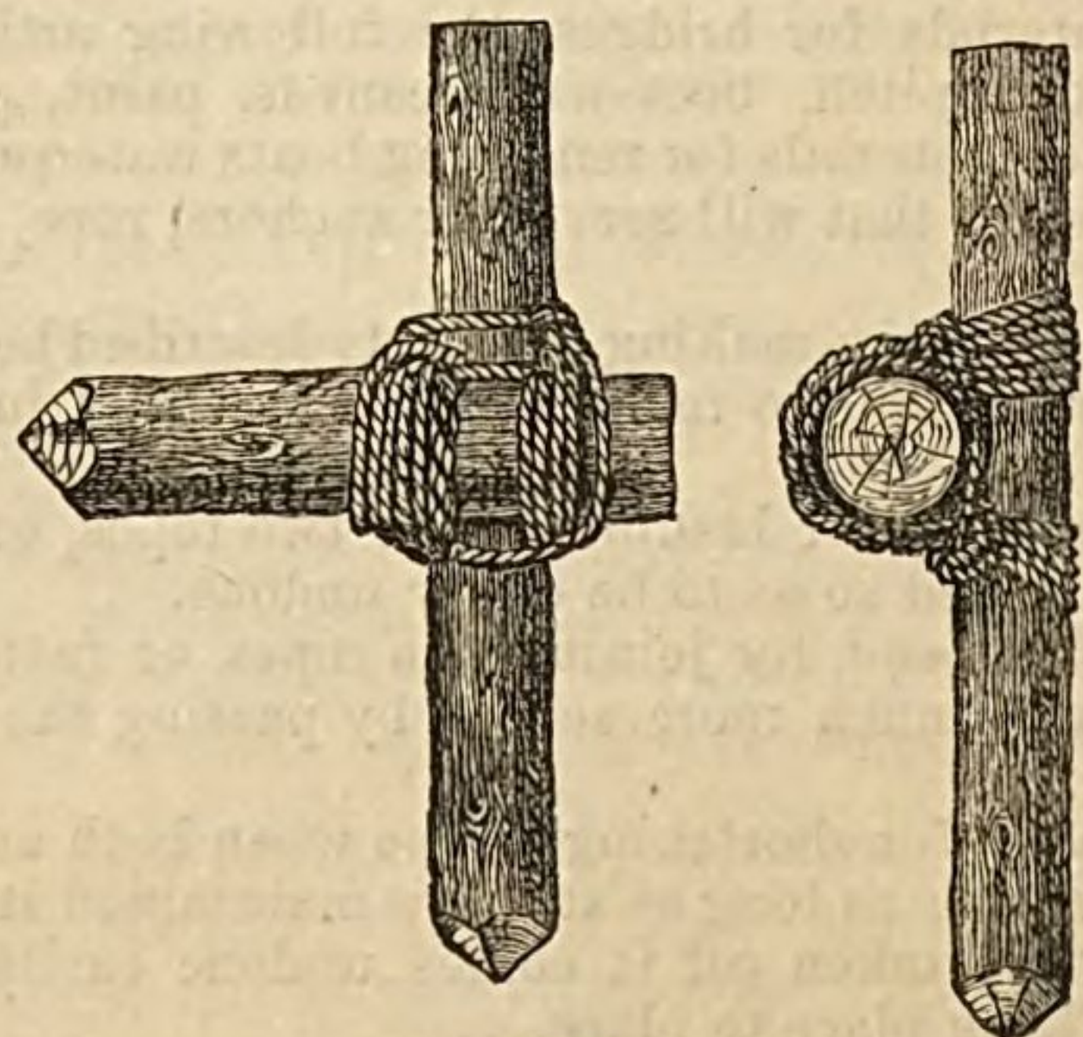


Fig. 37.

To lash a transom to an upright spar, Fig. 37, a clovehitch is made round the upright, below the position of the transom, the lashing brought under the transom, up in front of it, horizontally behind the upright, down in front of the transom, and back behind the upright behind the clovehitch, and so on, following round, keeping outside of, and not riding over the turns already made. Six turns or more will be required. A couple of frapping turns are then taken between the spars round the lashing, binding the whole firmly together, and the lashing is finished off with a clovehitch, either round one of the spars or any part of the lashing, through which the rope can be passed. The lashing must be well beaten with a handspike or pickhandle to tighten it up.

THE CUSTODY OF AMMUNITION.

All ammunition not contained in the waggons accompanying the army must be placed in magazines built for its reception, or in houses of the country selected for the purpose; storage for a large quantity will be required at the base and intermediate depôts. At the base the houses selected for it and the combustible stores should be at least 1000 yards away from any town or other storehouses.

If buildings are to be had, those of one storey, and of the most substantial nature should be selected; all lofty ones unless provided with conductors to be avoided; a church without a steeple, or, better still, a jail should be chosen if possible. To prepare them for the reception of powder, all windows, except those actually required for light and ventilation, should be built up. Buildings roofed with wooden shingle or thatch, to be avoided; If nothing but a wooden roofed house is to be had, it should be strengthened so that it will bear a covering of 6 in. of sodding. If the sides as well as the roof are of wood, an embankment of mud, if possible, faced next the house with stone set in mud should be built up all around it, so that no wood work should be visible from the outside. All inflammable substances to be removed as much as possible.

Field Magazines.

When there is good natural drainage, an excavation of $3\frac{1}{2}$ ft. deep, 7 ft. wide and 17 ft. long, with a roof constructed over it as shown in sketch on next page, will do well for 100 barrels, there being 7 rows of 14 barrels, with two barrels placed at the end of passage; or it would hold 600 boxes [360,000 rounds] of Henry-Martini ammunition. These measurements provide for a passage of 3 ft. leading into the magazine.

The measurements in these sketches are given in feet.

Fig. 38 is a plan of the excavation, showing how the barrels are arranged along the floor: Fig. 39 is a cross section on the line A B C D; Fig. 40 is a longitudinal section along E F.

The rafters are placed 18 in. apart from centre to centre, they are halved

together at top, and fastened with a wooden pin; below they rest upon a sill into which they are notched, they are then planked over, and a covering of earth 6 in. thick at top and 12 in. thick at foot of roof laid over all. If sods are to be had, the outer surface should be covered with them: if not, straw should be well mixed up with the earth, which should be put on in the consistence of thick mud.

Fig. 40.

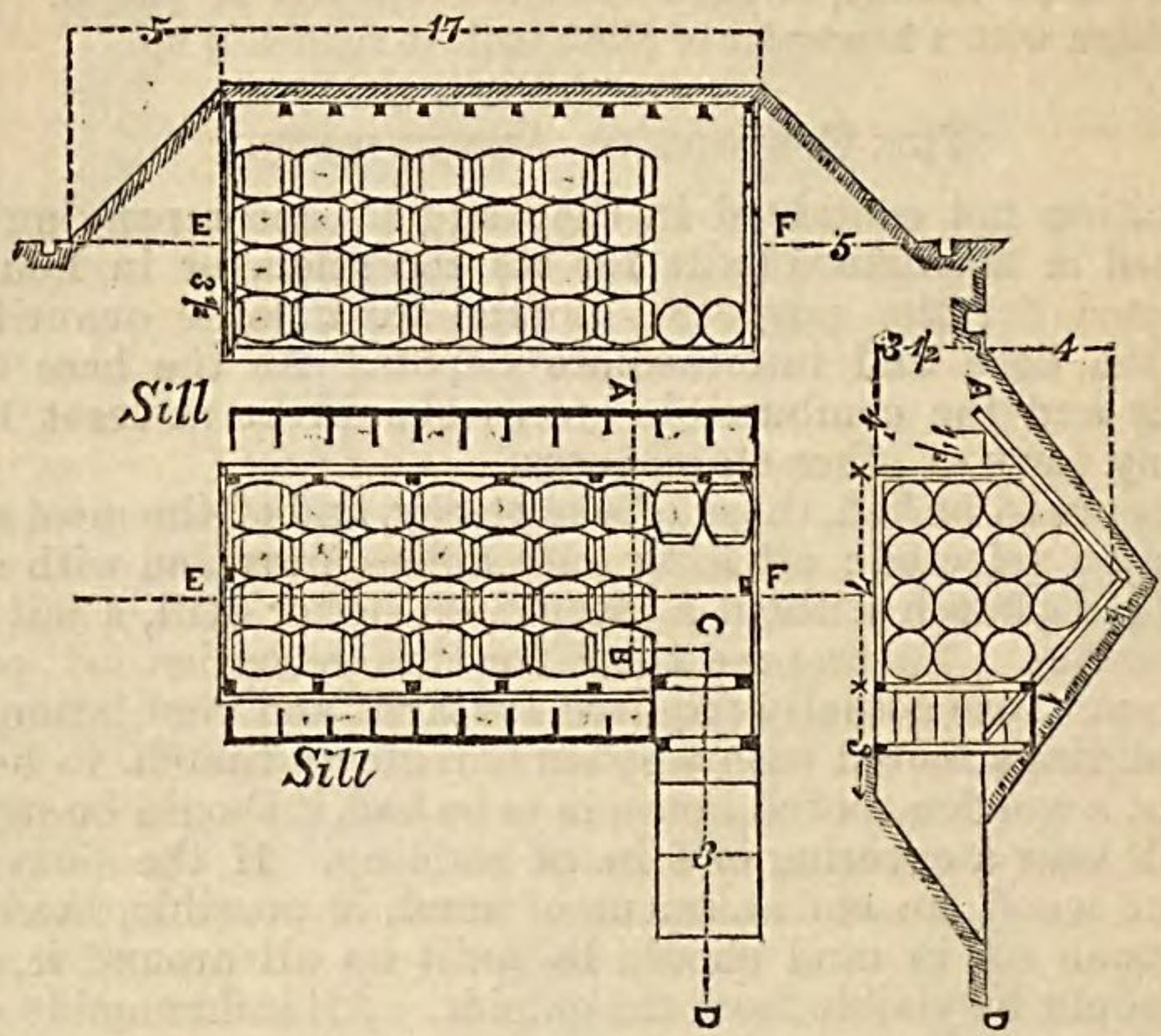


Fig. 38. Fig. 39.

Four poles are laid transversely across the bottom of the excavation, on which any rough description of planking is laid as flooring for the barrels to rest on—no flooring is necessary for the passage.

A surface drain of about 2 ft. deep should run round three sides, and a trench 6 ft. deep should be dug along the 4th side, from which the passage opening into the magazine will be cut at one end; care to be taken that there should be good drainage from this trench into some neighbouring watercourse.

The materials required for this magazine would be 24 rafters 7 ft. long, not less than 4 in. in diameter at smallest end, if made of poles, or 5 in. × 2 in. if made of scantling; 11 poles of same dimensions and 2 poles 10 ft.

long, to support planking of inside walls; 4 poles of 7 ft. long to lay flooring on; 580 square feet of planking not less than one inch thick; a door 5 ft. × $2\frac{1}{2}$ ft., and two door frames; one for the door and one to support the planking forming the porch outside. The barrels can be laid on loose stones if scantling and planks are scarce.

Magazines that may be exposed to the enemy's fire require a substantial covering of earth. The accompanying sketch is of a magazine for a field work [to contain 72 barrels of powder] where there is plenty of interior space. The measurements are given in feet.

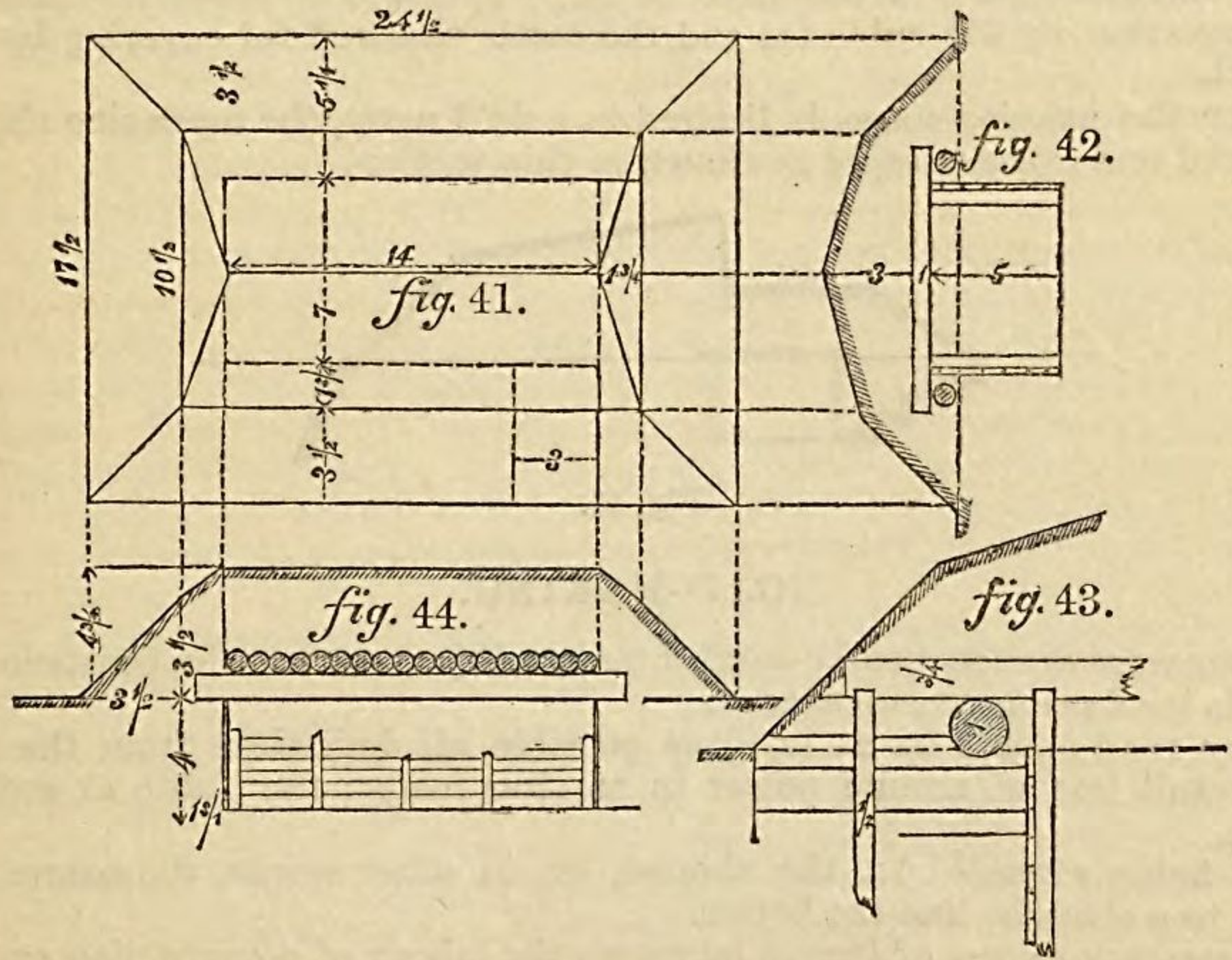


Fig. 41 is the plan, Fig. 42 the cross section, Fig. 43 is an enlarged section showing part of the passage and the uprights retaining the side planking; Fig. 44 is a longitudinal section. The splinter-proofs to be of trees, 9 in. in diameter, laid across the excavation; the earth is retained on the inside by planking or hurdles, kept in position by small poles or scantling of about 3 in. stuff sunk a foot in the ground and let in above 3 in. into the splinter-proofs, as shown in Fig. 43.

The excavation is 14 ft. long, 7 ft. wide, and 4 ft. deep; including passage, it amounts to 455 cubic ft. The earth required for the covering is

925 cubic ft., the excess would be supplied from the drain of 2 ft. deep round 3 sides, and from the trench of 6 ft. deep along the side where the passage leads into the interior.

The materials required would be 5 splinter-proofs 9 in. × 9 in., and 11 ft. 6 in. long for roof of passage and of magazine opposite passage; 16 splinter-proofs 9 in. × 9 in. and 10 ft. long; 2 wall plates 12 in. × 12 in., and 16 ft. long, on which the ends of the splinter-proofs rest; 17 uprights to retain planking 4 in. × 4 in. and 6 ft. long; and 330 square ft. of any planking above an inch in thickness. For every additional dozen barrels the length of the magazine must be increased 22 in., which will increase the amount of excavation by 61½ cubic ft., and the earth required for covering by 78½ cubic ft.

When the interior space is limited in a field work, the magazine should be placed under the parapet as shown in this section.

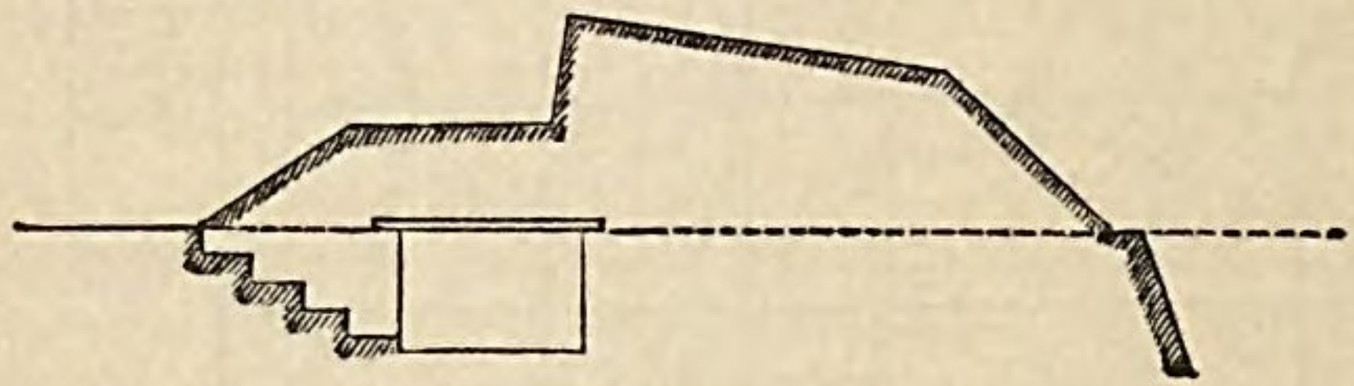


Fig. 45.

ROAD-MAKING.

As our wars are frequently carried on in wild countries, the construction of roads is of primary importance.

Every road should be as level as possible, all deviations from the true level entail loss of animal power in moving loads; see Table at end of Article.

This being attended to, the shorter, or, in other words, the nearer the road is to a straight line the better.

Unnecessary excess of length increases the labour of construction and of keeping it in repair, also the time and exertion in travelling on it. At the same time it frequently occurs from mountains, marshes, rivers, or valleys lying in the straight line joining the two points to be united by a road, that the short cut is practically "the longest way round," both as regards the labour in construction, and the animal force required to draw loads over the steep gradients which such a line would present.

Shortness, although a great object, must therefore give way to levelness.

In a country where small but steep hills are common, it is quite possible that a straight road running over their summits may be longer than one

winding round them at a constant level, as both may really be straight, one in a vertical, the other in a horizontal plane.

In order to avoid an ascent, a road may be advantageously increased in length by at least 20 times the height which is thus to be saved.

The following Table shows the loss of horse power for several slopes. It also shows the angles formed by several rates of inclination, and the number of feet ascended in every mile of road of such slopes.

There is a vast difference between the duty of an officer laying out a road during a campaign for immediate use, and of an engineer doing the same for a permanent highway in peace. The latter will, within certain bounds as regards expense, sacrifice everything to keep his gradients as low as possible, say to about 1 in 30. The officer, on the other hand, dare not commit himself to large cuttings, embankments, or bridges, and must therefore submit to frequent undulations and steep gradients, so long as they do not exceed 1 in 15. It may be necessary, however, at some points to go so far as 1 in 10, as horses for short spurts can quadruple their ordinary power of draught; all such steep slopes, no matter how short, are to be avoided, if by any practicable means it is possible to do so.

In carrying roads up heights, it is advisable to avoid having any partial descents. The gradients should be even, being, if necessary, somewhat steeper below than above. In zigzagging up hills, the curves should be on the level, as also a distance of about 50 ft. at the top of each straight piece, so that with long teams the whole draft may not be thrown on the wheelers at the turns.

The Cross Section on a military road should show a minimum width of 16 ft.; at particular spots where the labour of construction is excessive, this may even be reduced to 14 ft. for very short distances. Whenever it is possible to do so without great extra labour, a width of 24 ft. should be given, 17 ft. in the centre being macadamised. In zigzagging up hill the width should be $\frac{1}{4}$th more at the curves when the zigzags form an angle of from 120° to 90°, and one-half more when the angle is from 90° to 60°. Roads should be raised in the centre, their cross section should be formed of two straight lines having a rise in the centre of the road of from 4 to 6 in., where the lines meet being rounded off; this fall will suffice for drainage. Those formed along a hillside should be in a single slope from the outer to the inner edge, where the drain will be, to catch the water from the hills and prevent it from reaching the road.

Drainage is provided for by digging ditches on each side, leaving a space of 24 ft. for the roadway; their size must depend upon the humidity of the country. If meant to "intercept the water from hillsides rising above the road" they must be large, but as a general rule a width at bottom of one foot will suffice; their side slopes to be 1 to 1. They should lead to the gullies, &c., forming the natural drainage of the country.

To lay out a road.—It being necessary to connect two points, A and B, by a road, it must be remembered that one which will last for a year or two at the utmost is all that is generally required. The highway constructed between Balaclava and the Sevastopol plateau remains now as a monument of our ignorance of military requirements in such matters. Although the road may only be wanted for one or two campaigns, yet it will, in most instances, have to sustain an immense and constant traffic, sometimes by night as well as by day. This continual wear must be provided for more by arranging for its frequent repair by gangs of men told off permanently to every 3 or 4 miles, than by the character of its original construction.

The time, materials, tools, and number of men available for the work must greatly influence the form of its construction, and therefore the line that is to be selected. The more of these things one can count on, the more level the road can be made, but in the field the great art is to make the most of resources at hand.

A map, showing the country between the two points to be united by a road, is of great importance. If one cannot be obtained, a rough, traversed survey must be made of the footpaths following the required line. Rough horizontal sections to be made along them.

If there is not time to do so, the heights must be estimated by the eye, or by means of an aneroid barometer. (See Article on "BAROMETER.")

The difference of level between the termini and the highest point to be crossed having been thus ascertained, and divided into the distance between those points, will give the general gradient. If it is too steep, the ratio must be increased by adding to the length of the road by carrying it round instead of directly across hills. Thus if the difference of level is 500 ft., and the gradient has been fixed at 1 in 20, the road must be at least 10,000 ft. long.

Take the road over gravel as much as possible, for with such a subsoil the drainage is always good, and no metalling is required.

When the country is hilly or much intersected by rivers, there will generally be certain points in the line to be followed, by which the road must pass, such as low gaps in hills, fords, or parts of rivers, favourable for the construction of bridges. Such points are to be noted at once on the map, and all attention turned towards deciding the line the road is to follow in connecting them. There will also be some obstacles, such as precipices, ponds, marshes, of such a self-asserting nature, that if by any possibility they can be avoided the road must pass round them.

In laying out roads, follow as much as possible the course of streams running in the required direction.

In crossing a range of hills or mountains, a line of road should be sought for wherever it is found that the sources of streams flowing down the opposite slopes approach nearest one another.

When time and labour is of great consequence, it is sometimes easier to carry a road by zigzags over a hill than by following the course of the stream, where cuttings and considerable blasting may be necessary. In doing so the fewer the zigzags the better.

In deciding upon a line of road through forests, the highest trees should be climbed to obtain a good view ; the course selected to be marked by notching the trees with an axe as you go along.

In the open, the line should be marked out by small piles of stones or stakes at every 50 yards, curves or zigzags being lock-spitted where necessary.

Construction of the road.—The centre of the road having been marked out by pegs or small piles of stones, a practicable path, 5 ft. wide, should be made along its entire length to facilitate subsequent work. Lines scored with a pickaxe, or marked by stones, put two or three apart, should be laid down on each side to mark the outer edges and the position of the ditches.

In some places the earth from the ditches will be required to raise the road, but in general it is advisable to throw the excavated earth on the outside. The width the road is to be must then be cleared, all large stones broken small, and trees rooted up from it.

When it is possible to pull trees down by ropes fastened to the uppermost part of their stems it is better to do so, the roots being cut through for that purpose.

In levelling the surface for the reception of the broken stone, a common plough can be used with great advantage in skimming off irregularities of surface.

In running roads through woods, the trees should be cut down for 20′ on each side of the road, the stumps being left in the ground : the timber can be used in construction or burnt.

Metalling.—As soon as the line has been approximately determined upon, the largest available number of men to be set to work along it, breaking stones and collecting gravel or timber, according to the material intended to be used. The stone hammers should weigh 1 lb., with heads 5 in. to 6 in. long, and 18 in. handles for use when sitting, or 3 ft. long when standing. For every ten of such hammers there should be one weighing 2 lbs., $6\frac{3}{4}$ in. long in head with a 3 ft. handle.

The stones to be broken up so that each piece should be about the size of a hen's egg.

The best stone is that which is hardest to break up, such as whinstones, basalts, sienitic granites, and beach pebbles ; soft granites, sandstones, and the ordinary limestones are bad, but for military roads whatever may be the stone at hand it must be used ; if there are several kinds available, but in limited quantities, the hardest description should be reserved for the surface. The slag from furnaces is a good material. A medium labourer

can break in a day from $1\frac{1}{2}$ to 2 cub. yards of soft, or from $\frac{1}{2}$ to $\frac{3}{4}$ cub. yard of hard stone. Broken stone occupies twice as much space as when solid.

When the road has been levelled, and prepared for metalling, if there are plenty of loose stones about, have them placed on it so as to form a covering of about 6 in. in thickness. Sand bags are useful for collecting stones, a bag of some sort or other being given to each man of the party told off for that work. When the stone thus collected has been thrown on the road, gangs of men working side by side can break it up with their long-handled hammers.

When the road has to be taken along the side of a hill, it is made half in excavation and half in embankment. The diagram explains itself. The steps, *a a a*, are cut to prevent the earth slipping, and the ditch, *b*, is intended to prevent the surface drainage from reaching the road.

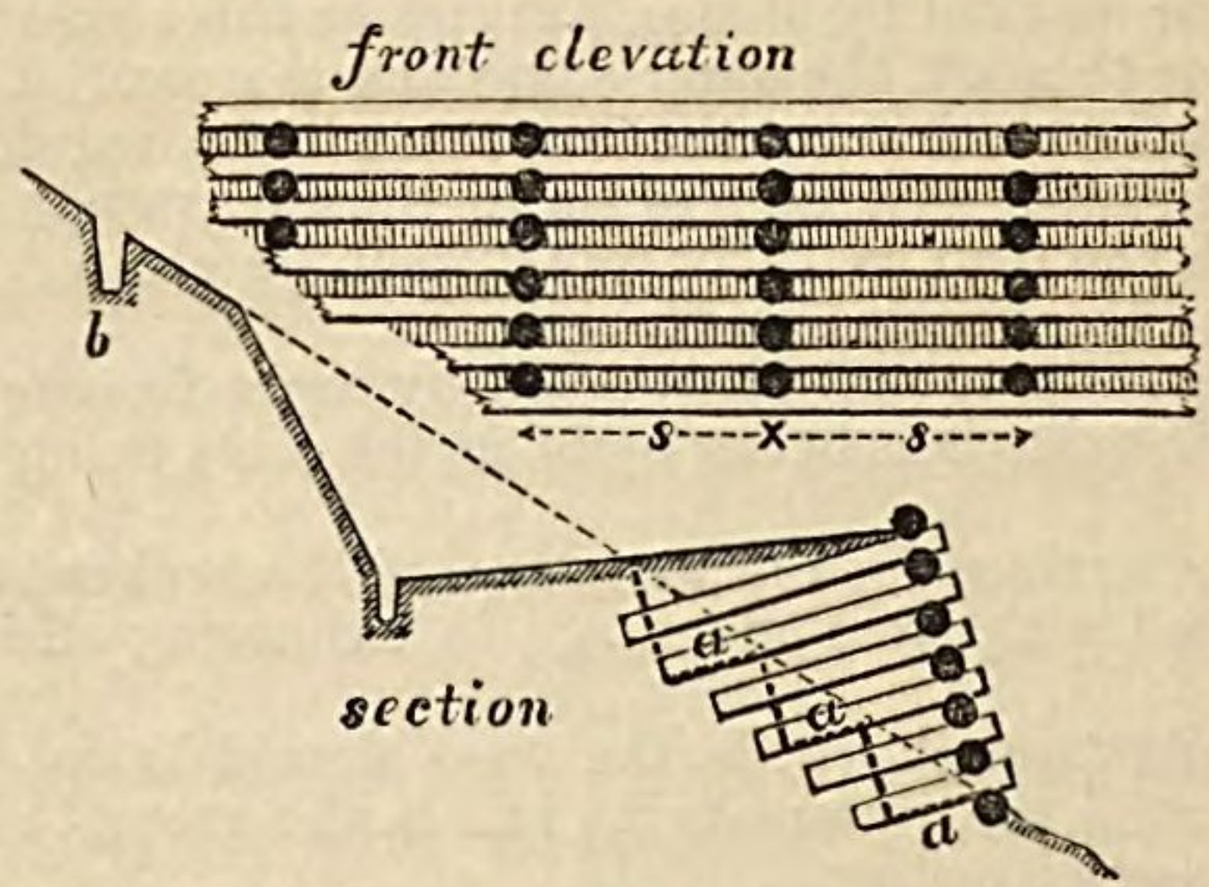


Fig. 46.

Retaining Walls.—The angle at which the soil will stand decides whether retaining walls are necessary or not.

Owing to the steepness of a hill round which a road is to be carried, it may be necessary to support the outer slope of the made portion by a revetment wall of dry masonry built with a slope of 3 in. in every foot, and having a thickness at top of $2\frac{1}{2}$ ft.

The largest possible stones should be used; those with rounded surfaces must be broken with the hammer before they will bind. There should be a parapet wall of about 2 ft. above the road. When wood is plentiful it should be used in preference [the larger it is the better], being built up with a slope of 2 in. to every foot; the timbers are kept in position as shown in the diagram. The braces should be 8 ft. apart, and sunk at least

3 ft. into the firm unmade ground; they should be notched into the timbers forming the retaining wall, as shown in Fig. 46.

Corduroy Roads.—In well-wooded countries, particularly if the drainage is bad, or the country swampy, they are excellent substitutes for macadamised roads. They are made by laying young trees of from 6 in. to 12 in. in diameter side by side and close together to form the surface. A pole of about 6 in. by 6 in. should be pinned with spikes or treenails along their outer edges to keep them in position.

Embankments may be formed easily with timber when it is in abundance, as in Canada: the logs being laid at right angles with one another, the upper surface, if it is for a road, being corduroyed over.

Fig. 47 shows such a road in section, Fig. 48 in elevation.

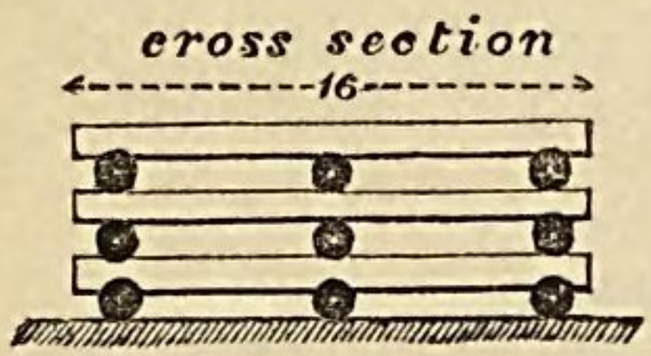


Fig. 47.

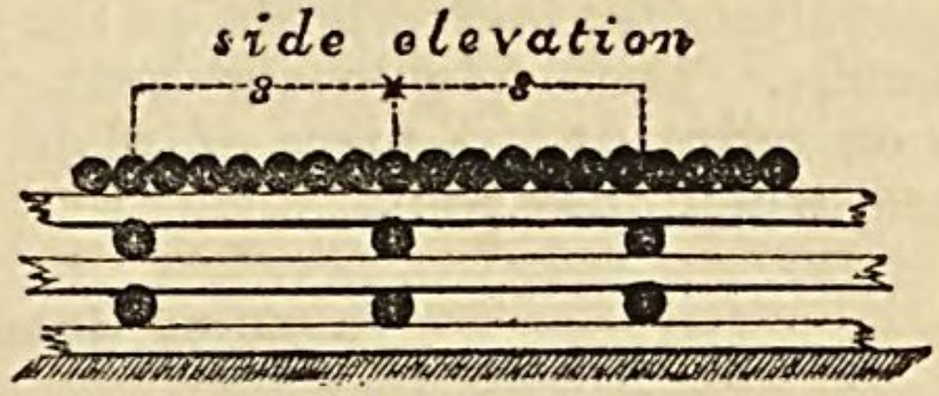


Fig. 48.

In all corduroy work it is most desirable to adze away the logs along the wheel track so that the wheels may pass over an even surface. The interstices between logs may be advantageously filled up with some small boughs, chips, sand, &c. We used this species of road to a great extent during the Red River expedition.

Plank Roads.—When 3 in. planks are to be had, they form the very best of roads for military purposes. For a 16 ft. road the planks should be laid on four sleepers, if they are to be had, the outer ones 5 in. by 5 in., the inner ones of 6 in. by 2 in. laid on flat side; if not to be had, planks can be used in their stead, or they can be dispensed with altogether, the planking being laid on the ground. The sleepers should be sunk to a level with the surface; the junction of one row of sleepers should not be opposite that of other rows, and a piece of plank about 2 ft. long should be placed under each junction. The spikes used should be 5 in. long [22 lbs. to the 100 spikes], with chisel-shaped edges, which are to be driven across the fibre; wooden spikes can be used if iron is not to be had. Before laying the planks, the road should be brought to a plain surface. If there is plenty of material at hand it is a good plan to spike down a piece of scantling about 5 in. by 5 in. along

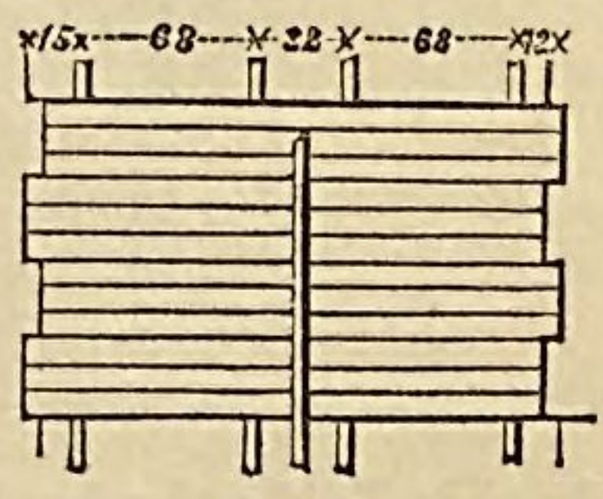


Fig. 49.

the centre to keep the wheels in their proper places. The planks should be laid as shown in Fig. 49 [the measurements are all shown in inches], for if laid with even sides it is difficult when a wheel gets off the planking to get it on again. An inch coating of small stone or gravel can be laid over the planking with great advantage. A horse can draw on a plank road from twice to three times as much as on an ordinary macadamised one.

Swamps.—In carrying roads over swampy places, strong hurdles, laid on the ground, or fascines, or even loose brushwood [not exceeding 2 in. in diameter] laid close together will form a good foundation; they should be covered by 6 in. of broken stones or gravel.

Wooden Tramways.—If timber abounds, wooden gutters may be laid with great advantage for the wheels to run in. It is not necessary that there should be gutters for both wheels, as the outer side of the road may run on simple planks. These planks and gutters are laid on ties in the way that rails are on railroads. A piece of planking 3 ft. long should be placed under them where they join.

TABLE OF GRADIENTS.

Inclination.	Angle.	Rise in Feet per mile.	A Horse can Draw.
	° ′		
1 in 10	5 43	528	·25
1 in 11	5 11	480	·265
1 in 12	4 46	440	·28
1 in 13	4 24	406	·295
1 in 14	4 5	337	·31
1 in 15	3 49	352	·325
1 in 16	3 35	330	·34
1 in 17	3 22	310	·355
1 in 18	3 11	293	·37
1 in 19	3 0	277	·385
1 in 20	2 52	264	·4
1 in 24	2 23	220	·5
1 in 25	2 18	211	·52
1 in 26	2 15	203	·54
1 in 30	1 55	176	·64

In this Table the load which a horse can draw on the level is taken as represented by 1.

In ascent a perfectly smooth road tells more against draught than one of ordinary roughness.

Ascents tell more on a horse than on a man: that is, every additional

degree added to the gradient causes greater loss of power to a horse than to a man, in proportion to their strength.

RAILWAYS.

In all future wars, the main lines of supply will, in civilised countries, be along railroads. Indeed, when the contest is likely to be a protracted one, and the topography of the country is favourable, it will often be advisable to lay down a railway temporarily, as we did in the Crimea and Abyssinia. We were the first nation that demonstrated how feasible and useful it was to do so. As for such an operation there will always be engineers especially appointed, no attempt will be made here to explain the manner of doing so; but it is strongly recommended that all staff officers should carefully study the construction of railways as practised in America. The English system is more applicable to permanent constructions, everything being well finished, and immense works undertaken to obtain the lowest possible gradients, whereas in America, where lines are run through wildernesses, economy of construction is the first great object aimed at. The influence of railroads is strategical rather than tactical.

WORKING OF RAILROADS.—Previous to an army embarking for the theatre of war, every arrangement must be made for working the railroads which are to form the chief lines of communication: much will, of course, depend upon whether the existing staff on such lines can be relied on, or to what extent it will be necessary to supplement it, or whether it will have to be replaced altogether.

It may be necessary to send out engines and rolling stock; for, if the enemy can obtain any power over the railroads before your arrival, he will destroy the rolling stock, or run it off into his own territory.

For the general working of the line, a Superintendent should be obtained from some of the large English railroads; he should be well paid, and attached to the Q. M. General's Department, with local or high honorary rank, being considered a staff officer attached to the General especially named for the protection of the lines. We understand the construction, working, and administration of railways better than any nation in Europe; and, from the numbers employed upon our network of iron highways, we can always obtain the very best railway staff in the world; but it is absolutely necessary that that staff should exist on paper in time of peace, and be capable of mobilisation upon the shortest notice. The Superintendent selected should be assisted by an efficient staff selected by himself. Under his orders there should be an especially enlisted "Construction Corps" of workmen, for the repair and maintenance of the road, to

be organised under military officers. Taking, as a model, the corps established by the Federal Government during their war, the organisation might be into battalions, as follows, their number being according to the necessities of the service; one man a mile, or two to every 3 miles, will generally be ample.

Battalion of Construction Corps.

Staff of Battalion.

- Commandant, a Major of Engineers especially selected for his knowledge of railway work.
- 2nd in command, a Captain R.E., ditto, ditto.
- A Quartermaster.
- A Sergeant-major to act as clerk.
- A Rodman [to be a staff-sergeant].
- 2 Messengers.

1st Subdivision.

No. of men.	
1	Engineer of bridges. To be an officer of R.E., selected for his knowledge of bridge making.
1	A Quartermaster.
1	A Surgeon.
1	Sergeant-major to act as clerk and time-keeper.
1	A Hospital Steward [staff-sergeant].
1	A Quarter-master-sergeant [staff-sergeant].
6	One Sergeant to every 50 men, to act as foreman.
30	One Corporal to every 10 men, to act as sub-foreman.
300	Mechanics and labourers.
2	Blacksmith and helper.
12	Cooks.

Making a total of 3 officers, 3 staff sergeants, 6 sergeants, 30 corporals, and 314 privates.

The 2nd subdivision to be the same, except that the officer in command and the men under him should be skilled in laying rails.

The 3rd subdivision to consist of a clerk of the works to supervise the water stations, having under him a sergeant as foreman, 12 mechanics and labourers, together with one cook.

The 4th subdivision to consist of a clerk of the works experienced in masonry, with a sergeant [to be a mason] as foreman, 10 masons and helpers, and one cook.

The 5th subdivision to consist of three experienced guards, to be 1st class staff sergeants, and three others, to be sergeants at a lower rate of pay,

2 locomotive engineers, to be staff sergeants, 2 firemen, to be corporals, and one cook.

The strength of the battalion would therefore be—4 officers, 3 quartermasters, 2 surgeons, 17 sergeants, 62 corporals, and 655 privates.

They should be armed with the short rifle and sword bayonet, and drilled to their use, so as to be able to defend themselves, but should never be made use of as combatant soldiers.

PROTECTION OF RAILWAYS.—A railroad will always be, more or less, open to injury from cavalry raids ; it is therefore essential that the Brigadier or General in command of the line of communications should have at his disposal a force sufficient for its protection. The nature of the country, the character of the enemy, the composition of his army, and the disposition of the inhabitants, can alone determine what number will be required, and what is to be the proportion of cavalry to infantry, &c., &c. The more mounted infantry that can be spared for this work the better.

It is folly attempting to guard a line by distributing along it 10 or 12 men to the mile. Central points must be selected as positions for flying columns, ready at all moments to move out, either by train along the line, or on horses, and in waggons along the country roads, to pounce down by forced marches upon the enemy's columns. The position of these flying columns to be changed constantly.

Small cavalry parties should scour the country to the right and left of the line to the greatest possible distances compatible with their safety, telegraph stations being pushed out, and signal stations posted on commanding ground still farther out, so that it should be impossible for any movement to be made by the enemy within the zone thus watched, without its being immediately known to the several flying columns.

A good system should be thus established for watching the enemy, the country people being well rewarded for giving correct information.

The inhabitants to be informed by proclamation that any of them discovered injuring the railroad or telegraph, or attempting to obstruct the former, will be hanged without mercy. In some countries, it may be possible to make the inhabitants living along it responsible for its preservation, and it may sometimes be necessary to make severe examples by burning the houses near the spot where any injury has been done to it.

The most vulnerable points of railroads, as explained in the article upon their destruction, are large tunnels, viaducts, and bridges. In many instances it may therefore be necessary to protect them by block houses containing small garrisons of from 20 to 100 men, each being commanded by an officer. Some should be made proof against field guns, and all should be made as strong as possible by means of all available obstacles. A Mitrailleur, with a good supply of ammunition in each, would add

greatly to their power of defence. Fire balls are useful on dark nights to show what an enemy investing the block house may be about. It is sometimes very necessary that there should be a block house at each end of a viaduct or long bridge, when it is advisable to inclose with palisading some little space all round the bridge, strong gates being arranged for allowing trains to pass. The object of all such works is merely to protect the bridges until the nearest flying column has had time to arrive, for it must be remembered that it is by closely watching the enemy, and not in holding the line itself, that you can alone hope to protect it efficiently.

DESTRUCTION OF RAILWAYS.—It must be remembered by all officers commanding patrols or small reconnoitring parties that they are not upon any account to destroy railroads without orders emanating from the General Commanding, for it is possible they might paralyse the future movements of an army by doing so.

A railroad may be rendered useless to an enemy by destroying the track itself, by destroying or removing the rolling stock, or by destroying the means of supplying fuel and water to the engines.

The subject must be considered under two heads.

1st. When from their being no likelihood of a railroad in an enemy's country ever being of use to you, it is advisable to destroy it in the most effectual manner possible.

2nd. When, from its being in your own territory, you do not wish to destroy great works, such as large bridges, tunnels, &c., &c., or when, from it being likely that you may again, in a short time, require it for your own army, you desire only to render it temporarily useless to the enemy.

1st. In destroying a line when time is of little consequence, the rails, chairs, &c., should be removed to the rear to be made use of as required on the lines in use by your army. In most instances, however, time is a great object, as such duty generally devolves upon bodies of cavalry, who have succeeded in cutting in upon the enemy's line of communications, and who have consequently to make all possible haste to escape being cut off. The most vulnerable points are large viaducts and bridges, particularly if they are made of wood: if of brick or stone, powder must be used to destroy them; when time permits the piers of the viaducts should be destroyed as near the ground as possible. (See Article on the "DESTRUCTION OF BRIDGES.") In destroying woodwork by fire, whatever oil can be obtained from the neighbouring houses should be poured over it to make it burn quickly; coal oil is the best. If there are tunnels, to blow one in at several points where the ground above is of a sandy nature, is the most efficacious means of blocking up a line.

In all deep cuttings where there are retaining walls, a few charges of

powder, exploded judiciously behind them, soon fill up the cutting. If telegraph wire and fallen trees are intermingled with the débris, the work of clearing it out is rendered much more difficult.

Some countries are so level that railroads running through them present no bridges or embankments for great distances. To destroy the rails and ties, or sleepers, is therefore the only means of rendering them useless.

Fig. 50.

Curves should always be selected, as it is more difficult to repair them than straight pieces of the line. To tear up rails is not so easy as some may think. On railroads, the workmen draw the spikes with clevis bars and claws, and unscrew the nuts and bolts with wrenches, all of which are too heavy to be carried by cavalry soldiers.

A good substitute for a wrench can be made with a screw bolt and two nuts, as shown in Fig. 50, the first nut being screwed on the bolt as far as it will go; and the other screwed on just far enough to fit the heads of the screws or nuts to be removed. In all fish joints where there are bolts and nuts made use of, these wrenches can be easily made, the first two nuts being removed by tapping their corners with a stone or hammer until twisted off: when one has been made, more nuts can be removed by it, and any number of others made by them.

When there is plenty of time, the wooden ties or sleepers should be made into long piles and set fire to, the rails being placed across them, and when sufficiently hot in the middle bent up into the shape of a U, or round a tree or telegraph pole. It is of the greatest consequence that rails should not only be bent, but twisted as well, for if only bent they can easily be straightened, as explained in Article on "RECONSTRUCTION;" but if well twisted, they must be re-rolled before they can be of any use.

As, however, time will in most instances be of the utmost consequence, it is desirable that some means be devised for tearing up rails rapidly, and bending and twisting them when cold. The following is a description of a plan invented for that purpose during the late American war.

Two pieces of U-shaped iron or steel about $6\frac{1}{2}$ lbs. each [see *a* in Fig. 51], are placed under the two ends of the rail shown in sketch; levers [*b*], 11 or 12 ft. long, and $4\frac{1}{2}$ or 5 in. in diameter at the large end, are inserted in the irons, when by pulling on the levers the whole rail is ripped from its fastenings in less than half a minute, and the chairs broken.

A detachment intended for the destruction of a railroad should be told off into squads of 10 men: to each should be given before starting, 2 of these U-shaped irons, 2 axes, and 2 pieces of stout rope, each 6 yards long. A supply of the torpedoes described in Article upon "DESTRUCTION OF BRIDGES," should also be taken upon all such expeditions.

Having reached the part of the line selected, each squad should be given 12 rails to remove; suppose the rails to be 20 ft. long, there would be 45 squads to a mile of road. Say the detachment consisted of 1000 men, there would be 450 to destroy the mile of rails, leaving 550 men to cover the operation.

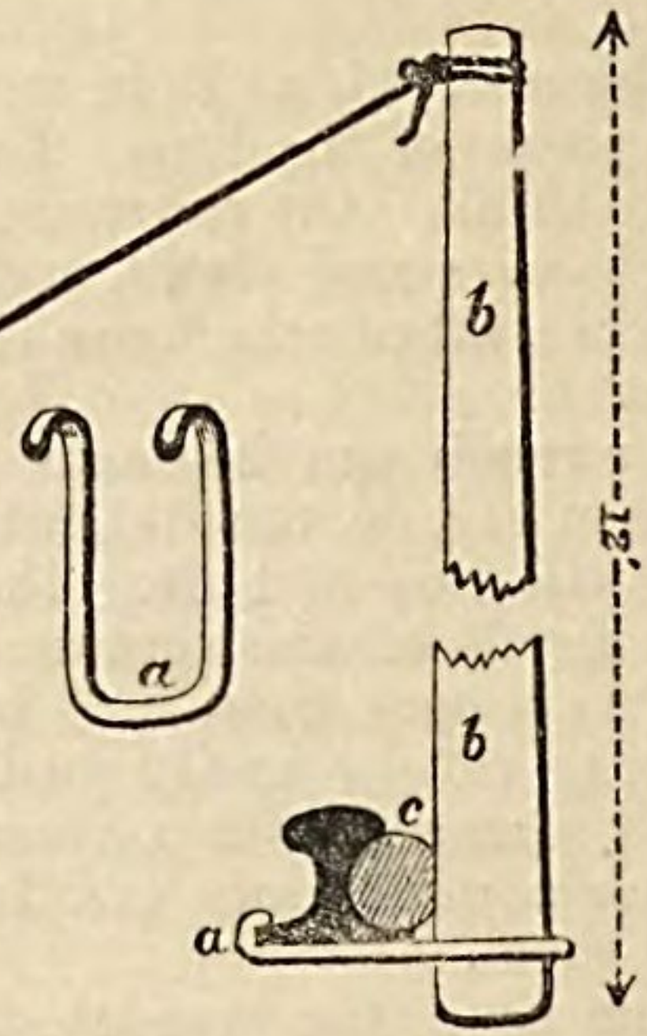


Fig. 51.

Each squad should at once provide itself on the spot with two wooden levers of the dimensions already given, and two wooden wedges or blocks [*c* in sketch] to place between the rail and the levers; the ropes, *d*, to be fastened to the small end of the levers. The 2 U-shaped irons having been forced under one end of a rail near together, and the wedges and levers placed as shown in sketch, one lever is pulled on and bent down to the ground, with the second a further twist is then given as far as it can be moved; a fresh hold is then taken with the first and the operation continued until the twist is sufficient. The rail can then be bent by pulling on a rope attached to the loose end, and afterwards removed altogether by applying one of the levers to the end which had remained fastened. Five minutes is sufficient time to twist, bend, and remove a rail, so in one hour, the 12 rails told off to each squad ought to be removed: in fact, 450 men should in that time destroy a mile of road. The ties should then be stacked by each squad, a couple being split up to make them burn the quicker. If coal oil is to be had in any of the neighbouring houses, it should be poured over them with that object.

Rails vary in weight from 50 lbs. to 70 lbs. the yard.

To destroy Locomotives.—It is most desirable that all officers should make themselves acquainted with the several parts of the machinery named in the following paragraphs.

Draw off the water from the boiler, light a large fire in the fire-box; this will destroy the flues. The most efficacious method is to fire a round shot through the boiler. The latter plan should always be adopted when it is possible to do so.

To Disable Locomotives without permanently injuring them.—Remove to a place of security, or hide any of the following pieces of the machinery. The pump rams, clacks, or delivery pipes; one or both safety valves; the mud plugs of boiler; the link connecting the slide valve to the valve gearing; eccentric straps; one or both cylinder tops or covers. To fill the suction pipes of the pumps with melted resin or lead, or even with cotton waste or tow, would be temporarily effective, and many hours might elapse before the cause of stoppage was discovered.

To Disable Tenders in a similar manner, remove the hose pipes, coupling bar and chains between engine and tender, or the brasses from the axle-boxes.

To Disable Passenger Carriages, Trucks, &c., without permanently injuring them.—Remove one or both wheels [or in American cars, one or both trucks]. Take off the axle guard or the bolts from one or two of the guard plates; the brasses from the axle-boxes, or the draw bars. The two last are most easily effected.

To destroy Passenger Carriages, Trucks, &c., burn them.

In fine, all piles of coal or other fuel should be burnt, the water tanks and the pumps used for filling them destroyed, and all shops for the repair of engines, &c., and everything that will burn, set on fire.

2nd. *To render a line temporarily useless*, so that whilst it would take much time for an enemy to repair it, you could do so quickly yourself, will depend much upon your respective resources. If you know that he cannot provide rails, remove a hundred yards of them at various intervals; if he has no supplies of telegraph wire on hand, remove it. Remove the pistons from all the pumps supplying water to the tanks; provided that you can easily replace them, you can even go so far as to destroy a bridge; take care that all rolling stock and fuel is removed within your part of the theatre of war.

Railway communication was upon many occasions temporarily intercepted by the cavalry during the late Southern struggle for independence in the following manner: a high embankment having been selected, a couple of thousand men were dismounted and formed in single rank along a rail, but outside of it, and facing inwards. The rails at both flanks were disconnected, so that the portion of the line to be torn up occupied by the single rank of men, was not fastened to the rest of the line. Upon a given signal

the men stooped down and grasped the rail, and upon another signal, all lifted it up to a vertical position, with the ties fastened to it, and then let it fall over on the other side down the embankment. The rails could not then be replaced without unfastening them from the ties, and relaying the whole superstructure. When the ties or sleepers are very firmly fixed in the ground, the operation of overturning a section as described can be facilitated by using poles or rails as levers under the rails.

Repair of Railroads.—Repair of railroads will be effected by the Reconstruction Corps, its headquarters being at some central point, where workshops can be established in safety. All bridges and culverts within possible reach of the enemy should be numbered and classified under a few heads, such as 1st, 2nd, and 3rd class, according to their dimensions; materials for the complete renewal of each class should be kept ready in the central depôt, so that if information is received at any moment that such or such a bridge or culvert has been destroyed, the Reconstruction Corps, in starting to repair it, can take exactly what is necessary for doing so; this should be carried out so far, that even trusses of the various sorts to suit the spans of the larger bridges should be kept on hand ready for conveyance to any part of the line.

In all secure places there should be an ample supply of rails, spikes, sleepers, and tools necessary for reconstructing the permanent way should it be destroyed. All rails that are only slightly bent into a curve without being twisted, are easily straightened by means of a common jack-screw or jim-crow, or by sledges.

General Haupt, of the Northern army, used the following contrivance for straightening rails that had been simply heated in the centre and bent. Five blocks of wood, *a*, *b*, *c*, *d*, *e*, about 10 in. square, and 5 ft. long, were placed as shown in Fig. 52, where *x x* is the rail. The top one was notched to the

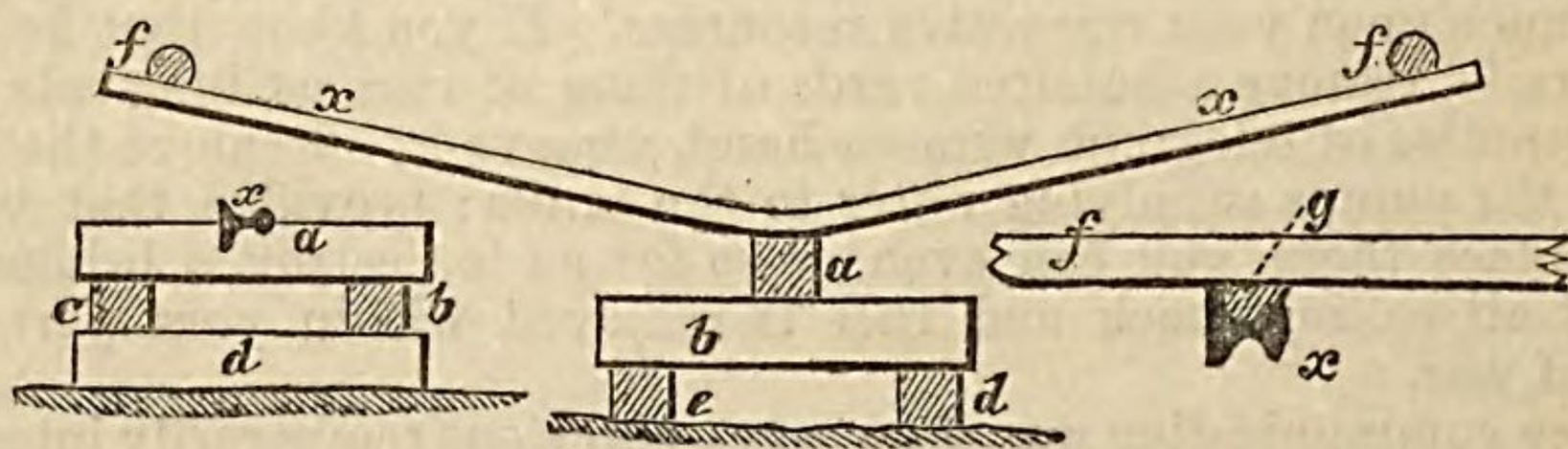


Fig. 52.

shape of the rail so as to receive it, and prevent it from turning; pressure was applied by from 12 to 16 men at each end by means of two poles, *f f*, about 3 or 4 in. in diameter, a small piece of some hard wood, *g*, being placed along each end of the rail to form an even surface for the poles to

rest upon. The men on each side would press down or relieve the pressure at the words "down" or "up," the rail being moved backwards or forwards or turned as required.

After a short drill the negroes employed were able in from 2 to 3 minutes to straighten a rail so that it did not vary from $\frac{1}{4}$ to $\frac{1}{2}$ in. from a straight line, permitting it to be laid in the track and spiked; these short bends could, if necessary, be removed afterwards by the jack-screw apparatus.

As a general rule it was found that those bent with a curve of 1 ft. or more radius, could be thus straightened in from 2 to 4 minutes, while those which had been heated to a high degree and bent at a sharp angle, could not be restored without heating and hammering.

No time should be lost in attempting to straighten the latter; when cold they should be put on one side to be sent, when the new track has been laid, to the place prepared for heating them, &c.

A furnace for doing so can be made with two parallel walls of brick, stone, or even clay, with bars laid across to hold the wood or coal. When heated, the rails are laid upon a straightening table and hammered until the bends are removed. Such a table is made with a piece of timber 12 in. square and as long as a rail, on which two rails are placed, base downwards, with a third between them base upwards, the whole being firmly spiked; the base of the top rail forms the plane surface on which the rails are straightened.

MOVEMENT OF TROOPS BY RAILWAY.

The experience gained in the late Franco-German war proves that, upon double track lines worked upon the continental system, time is not gained in moving large bodies of troops, including their proportion of guns and *matériel*, by rail, when the proportion of sabres and bayonets is greater than 435 to the English mile of the distance to be got over. In England, where rolling stock is practically unlimited, and our railways so well worked, I think that an English army corps (war strength) can be moved with a saving of time by rail, for any distance over 45 miles, being for large bodies of troops a proportion of 600 sabres and bayonets to the English mile.

On nearly all English railways there are two lines of rails, but in America and on most of the continental lines there is seldom more than one. The rapidity with which troops can be conveyed is greatly affected thereby, and the fewer the places where trains can pass one another on such single lines, the fewer will necessarily be the number of trains that can be at work at the same time upon every 100 miles of road; the number of trains actually running in each direction at the same time upon any line will be equal to the number of intermediate crossing places (the terminus at neither end being counted).

The experience gained during the American war shows that to supply an army of 100,000 in the field by means of a single line of rails the proportion of rolling stock should be, engines 0·25 and freight carriages 6·0 to every mile of road: this does not provide for the conveyance of troops. The following Table may be useful as giving a fair idea of the rolling stock possessed by several nations:—

Rolling Stock per Mile of Road.	English.	Irish.	Scotch.	Canadian.	United States generally.	The State of New York.	German.	Indian.
No. of Locomotives. . .	·709	·2448	·51	·21	·236	·243	·43	·2027
Ditto Passenger Carriages .	2·244	·86	1·327	·3	·16	·34	·807	·46
Ditto Freight and Goods do.	19·694	4·0	16·8	2·95	4·068	3·364	6·7	4·34

As these calculations include all branch lines, it may safely be assumed that on all main lines there will be about one-half more on foreign and one-quarter more on home lines.

In calculating the amount of rolling stock available for use, a deduction of 50 per cent. for locomotives, and of 30 per cent. for all carriages must be made for those usually undergoing repairs.

The gradients on a line will greatly influence the weight which engines can draw, as the following Table will show. It is drawn up assuming that the weight which any engine could draw on the level is represented by 1·00.

Gradient.	Engine will draw.	Gradient.	Engine will draw.
1 in 700	·75	1 in 60	·18
„ 500	·67	„ 50	·16
„ 250	·5	„ 40	·09
„ 100	·26	„ 30	·06
„ 80	·22	„ 20	·016

The average weight of an English locomotive is 28 tons when running, or with its tender 46 tons. In India the engine and tender when running weigh together about 35 tons only.

The number of loaded carriages that go to make up a train in England

may be assumed at 34 passenger, and 40 to 50 freight carriages, when the gradients do not exceed 1 in 330. An ordinary engine will draw such a train easily at 20 miles an hour, stoppages included, and such may be assumed as the pace at which troops can be moved with efficiency. The length of the sidings forms a limit to the length of trains that in single track lines is absolute. In America, where the gradients are generally steeper than in England, 10 to 15 passengers, and from 16 to 22 freight carriages go to a train, and the former would be drawn at the rate of from 16 to 22 miles, the latter at from 12 to 15 miles an hour.

In computing the number of soldiers (armed and equipped) that can be conveyed in any carriage the usual allowance is 8 soldiers to 10 ordinary passengers. A soldier should have 20 inches of seat as a minimum.

This Table gives the average weight and carrying capacity of ordinary carriages on British lines.

Carriage.	Weight (Narrow Gauge).		Carrying capacity.	
			Narrow Gauge.	Broad Gauge.
	tons.	cwt.		
1st Class	5	18	24 soldiers.	
2nd „	6	4	*32 to 40 soldiers.	50 to 60 soldiers.
3rd „	6	12	„ „	„ „
Truck	4 to 7	0 to 0	5 to 7 „ „	

* 4 Men on a seat.

A covered goods waggon carries 6 tons, and has a capacity of about 500 cub. ft. An ordinary goods truck carries 1 ton of straw, 1½ ton of hay, 5 to 7 tons of coal, 6 to 9 head of cattle, 30 to 45 sheep, or 1 of any description of gun or waggon (with limber) used in the field. A sheep van with 2 floors will carry 80 sheep or 2000 lbs. of bread (bread for conveyance by rail should not be packed in more than 4 tiers). A van (with break in it) for luggage varies in capacity from 300 to 500 cub. ft. and carries about 5 tons. A cattle truck to carry 7 to 8 horses saddled should be 17′ 6″ long, and 7′ 4″ wide, the entrance being at least 6′ 2½″ high: it should be covered at top and have the ends boarded up: the lower part of the door should be made to fall down on a hinge to form a gangway. For the conveyance of horses, the bottoms should be sound and at least 2″ in thickness. No covered carriage with a less interior height than 6′ 3″ should be used for conveyance

of horses. Open goods waggons may if necessary be used for horses, provided their sides are over 4′ high. If it is necessary to use goods waggons for the conveyance of men, seats with backs should be roughly fitted up: in estimating the number they will carry, the space required may be calculated at 4 sq. ft. per man.

On American railroads a first-class car carries 60 passengers, the other passenger cars generally 40: a box car carries 9 tons of freight, or 10 horses with harness on, or 9 cavalry horses, saddled with coats rolled, valises, &c., on saddle: a cattle car will take the same number of horses. A platform car or flat (29′ long and 9′ wide) will carry a 12-pounder gun, its limber and waggon with its limber, or 3 ordinary farmer's waggons, or 5 one-horsed carts.

Every movement of troops by railroad naturally divides itself into five distinct operations.

1st.—The march to the station where the embarkation is to be effected.

2nd.—The embarkation.

3rd.—The journey.

4th.—The disembarkation at the end of the journey; and

5th.—The march from the station when disembarked to the bivouac or camping ground.

1st. *The march to the railway station*, is a purely military operation, and when the numbers to be conveyed are large, is one requiring the greatest nicety of detail so that the numerous columns should not cross on the way, and so that all should arrive at the proper station and in proper time. Upon the quartermaster-general rests the responsibility for making these arrangements.

After due consultation with his railroad advisers, it is for him to fix upon the places where the several arms of the service should embark, and where the Commissariat is to load its stores; in general it is a good arrangement for the infantry to get into the trains at the passenger stations, reserving the freight stations for the cavalry and artillery. The time-table for the despatch of the force having been drawn up, and the routes to the various railway stations having been selected, the troops would be ordered to move so as to reach those points exactly at the hour required: the distances should be nicely calculated to insure this.

The approaches to the stations must be kept clear, and silence strictly enforced when the troops arrive near them. The arrangements to be made by the responsible staff officer require great care, but no matter how ably they may be devised, unless regimental officers enforce discipline most strictly whilst marching through a town to the railway, upon their arrival there, and whilst embarking in the carriages allotted for the reception of their men, all will be of no avail, and disorders such as those that we find took place in 1870 at Paris, Metz, Amiens, and other great termini, will certainly result. It is during such operations that the discipline of a regiment is tested, and that one discovers how much better it is in some corps than in others. Partial delays and

mistakes are inevitable, entailing more or less discomfort upon all ranks—but these petty inconveniences are necessarily attendant upon our lot as soldiers, and they should be accepted cheerfully. Grumbling about the delay, and finding faults with the arrangements made, is not the way to further the interest of the service or the ends aimed at by the special operation then in progress, but it is a certain method for causing disorder.

It is very necessary that only the troops for whom the carriages are ready should be allowed to enter the station, and the presence of all sight-seers, or friends with them, should be positively forbidden.

At some termini, such as Euston Square and Victoria Stations, there are inclosures outside where troops could be massed to some small extent previous to entering the station; the public should be strictly prevented from entering such spaces.

In a great movement of troops by rail, the very common fault of reaching the station too soon may overturn the best conceived arrangements. The dread of being too late is a bugbear that drives us constantly into the opposite extreme, and both extremes are nearly equally injurious in most military operations, and they certainly are equally so in moving masses of all arms by rail.

2nd. *The embarkation of the men in the carriages.*—The Queen's regulations give very good rules for this, but they only deal with it from what I may call a regimental point of view. Regarding it as a staff question, it is one that embraces so many topics that a volume could easily be filled with instructive information on the subject, as the general working of railways in war is embraced in it. In all movements of troops, whether by land or sea, one great rule is to keep the various military units as complete at all times during the operation as possible. Thus, it is not only essential that with Cavalry the horses and the men to ride them should go by the same train, but that whatever may be the number of sabres, bayonets, or guns conveyed by any one train, or ship, they may be fit for war, complete in every necessary field equipment, having their transport with them so as to march off without any delay upon leaving the train, or disembarking from the ship.

This is a point that civilian traffic managers are prone to forget or to ignore, so much so, that in all the railway problems worked out by order of the quartermaster-general from time to time by the railroad committee, consisting of railroad engineers and officials, I find that in moving troops they are sent forward without any transport. They calculate upon despatching trains at intervals of 8 minutes. Under such an arrangement the terminus where they would have to disembark would be in a curious state of confusion after the first hour when the troops began to arrive, being crowded with men unable to carry their ammunition, camp equipment or baggage.

Allowing 20 ft. as the average space occupied by a carriage, a siding should have a clear length of 240 yards to accommodate a train of thirty-four carriages. As our sidings exist at present, we may assume 40 carriages to be about the maximum number for all military trains in England. It is well to remember, however, that by sending a battalion of infantry in two trains, instead of in one very large, we reduce the rapidity with which we can convey masses of infantry by one half.

An English army corps requires 114 trains, without allowing any for control purposes; but adding on, say 21 trains for provisions and their attendant transport, the total for an army corps would be 135 trains, consisting of 4590 carriages of all sorts, or in other words, one railroad carriage would be required for every six sabres and bayonets, armed, equipped, and provided with their due proportion of guns, tools, pontoons, telegraph apparatus, hospitals, transports, &c., &c.

Assuming that in England by the most extraordinary efforts you could despatch 67 trains in the 24 hours (*i.e.* a train on an average of about every 21 minutes), it would take two days and two nights to despatch one of our army corps by any one line of double railroad under the most favourable circumstances. Consider what it would be to work a line for even two days under such pressure. It could only be possible by borrowing additional hands from other companies, or by denuding of servants the branch lines or the portions of the main line not comprised in the operation, so as practically to render them, for the time, almost useless to the public. I dwell upon this because men who are more scientific than practical sometimes forget in calculating the maximum carrying capacity of a railroad, that the physical power of the railroad official is an important factor in the sum. Although, saving accidents, and within certain wide limits, a locomotive is capable of sustained exertion as long as you tend it properly with fuel, water, and oil, still the man who drives or stokes it is not so capable. His powers are very limited, and without his proper amount of daily rest and sleep, he soon breaks down altogether.

The derangement of everything on a line of railroad over which masses of troops are being sent is so great, that in Germany the rule is to give a railroad terminus a rest of two days after the movement of any great force, or after a fortnight's continuous work. This is for the purpose of repairs, and for correcting the irregularities that are inseparable from such great operations.

In making these great railway calculations, it must also be remembered that, even under the pressure of war, it will seldom be possible to completely stop all ordinary traffic. The postal services must be attended to, and large cities, since the introduction of railroads, depend so completely on the provinces for food, that to stop the ordinary traffic would be virtually to starve their inhabitants.

A certain number of trains per diem must therefore be allotted for these purposes. I think, therefore, for ordinary calculations upon English lines, that we should not reckon upon being able to despatch more than about 50 trains in the 24 hours by any one railroad. During the great concentration of the two hostile armies in 1870, the Germans seldom ran more than 14 or 16 military trains during the 24 hours, the French from 20 to 25 in the same time; but then their trains were about twice as large as ours would be.

In estimating the number of trains you can run in a day, other important facts have to be considered. Supposing it has been accepted, as with us, that trains may be run one after the other, with intervals only of 7 or 8 minutes, have you enough rolling stock to furnish the required number of trains? In England the rolling stock is so very great, that this consideration may be passed over, as, practically, all being of the

same gauge, any amount that could possibly be required could be collected on any one line from the other great companies; but if operating abroad, or in an enemy's country, a very limited amount only might be at your disposal. The Germans calculate that carriages despatched loaded during the first day's movement, for distances not exceeding 200 English miles, can be back again at the starting point and again despatched loaded on the third day; for distances between 200 and 400 English miles, on the fourth day; and for distances between 400 and 500 miles, on the fifth day. In England, where the pace is greater and the trains smaller, we might, I think, calculate upon having this rolling stock again available in less time.

In movements over a single track line, the intervals between the departure of trains cannot be less than the time a train will take in running between the two crossing places that are farthest apart on the line.

Another point to be considered is, can you have a train ready loaded to start every 8 minutes? Admitting that it takes 30 minutes to place half a battalion of infantry, with all its equipments, regimental transport, &c., in a train, and double that time to load each train carrying cavalry, artillery, or stores, it would require at least five platforms, or five separate places where infantry could be embarked, so that a train carrying infantry could be despatched every 8 minutes, and at least nine such places if the trains were loaded with cavalry or artillery, allowing 10 minutes after the despatch of every loaded train for an empty one to be shunted back to take its place alongside the platform. Platforms unprovided with appliances for placing loaded waggons on the trucks, or for getting horses into the cattle trucks, are unsuited for the embarkation of troops. In some countries the cattle and other trucks are made so that their ends let down. A continuous platform can thus be formed by the portion of the train composed of trucks, those for the reception of horses being placed in rear of the passenger carriages, and the trucks to carry the waggons or guns being placed at the rear of all. The horses are walked from the end of the train (where there is always the means of getting horses and carts on to the end of the hindmost truck) to the most forward cattle truck, the end of each truck being raised, and replaced in its proper position as soon as each has received its proper complement. The same method is pursued with the carts and waggons. This is a much more expeditious mode of embarking them than by putting them in from the side.

At the London termini of some of our main lines there are great facilities for loading trains, as the platforms are numerous, and their goods stations are well provided with all the appliances necessary for loading cattle and stores. But although you may be able to despatch six or eight trains an hour from London, unless you can unload a similar number in the same time at the point of disembarkation, your labour will come to nought. Whatever may be the smaller number that he can either load at one end or unload at the other end of the line in an hour, that must be the number of trains despatched along the line in that time. It is therefore a great object to increase the facilities for the embarkation and disembarkation of troops to the utmost. In a country like England, several lines could always be made available in any great movement of troops, and the numerous branch lines could be utilised as affording places for embark-

ing and disembarking, without interfering with the principal stations on the main lines. In an operation that must, from its magnitude, extend over several days, especially if the movement is for a distance of over 50 miles, brigades or divisions might at the outset make one or more day's march, according to the magnitude of the operation, so as to reach a station, perhaps on a branch line, but at any rate some place where they could embark without blocking up the main line.

In the same manner, a great operation can be very much facilitated by sending some brigades or divisions to points within one or two marches of the point of concentration. They should be despatched if not the first, at least early in the operation, so that supposing the whole movement was calculated to last three or more days, they might have time to march from the points where they left the railway, to their destinations.

As much care is required that the troops at the end of their journey do not get jammed into the town, where the terminus is situated, and so block up the exits from it, as is necessary in keeping the approaches to the starting-point clear.

The construction of platforms for embarkation and disembarkation is a subject well worthy of study and of practice, for in England so little attention has been paid to military considerations in the construction of even our most important lines, that in case of war, or of invasion, we should have to erect many temporary platforms; for our short military trains, they should be at least 250 yards in length, and about 20 feet wide.

The second and third class carriages being constructed as a rule to hold five ordinary passengers on a seat, the simplest plan to load them with troops is; make the sergeants fall into the ranks, and then forming fours, march the leading company to the head of the train, opening out so that each section of fours is opposite a compartment; they are then halted and faced towards the carriages and ordered to enter them.

It is a good plan to have each carriage marked with the number of soldiers it is intended to carry; if there is time this may be done with chalk.

Previous to entering the carriages, infantry will be ordered to take off their valises, and to shift their pouches, haversacks, bayonets, and water canteens round to the front of their bodies; both straps of the haversack are to be worn outside the waistbelt, so that the former may be shifted without difficulty. This done, they will receive the order to get into their carriages, each man taking with him his arms, valise, &c.

Each man is to retain possession of his rifle, unless the commanding officer should think fit to allow the arms to be placed upon the valises under the seats, but they are never to be laid upon the floor of the carriage.

Horses should remain harnessed or saddled during railway journeys made as parts of any large movement of troops.

In the movement of supplies, it is a great matter if they can be despatched already loaded in carts or waggons, so as to be merely wheeled off the trucks at the end of the journey where horses should be in attendance to take them to the front.

This might be feasible when feeding an army from a base a few hundred of miles distant by rail, the empty waggons being sent back daily.

The strictest silence must be maintained in the ranks, from the moment of entering the station, until the train with its living freight has fairly left, and is clear of it.

The smallest possible number of men should be permitted to fall out whilst in the station. In order to prevent the necessity for their doing so, it is very advisable to have a ten minutes' halt somewhere near the point of embarkation when marching to it.

The men once in the carriages, to be kept there, only those required for fatigue being allowed on the platform; the fatigue parties should leave their arms and accoutrements in their carriages whilst at work on the platform.

Despatch of Cavalry by Rail.

On arrival of a cavalry regiment at the station the men will dismount, each man taking nothing but his carbine, except when the cloak is required for wear, and they will then be told off, so many to each carriage.

Having deposited their accoutrements on the spot selected, and in the same order in which they stood in the ranks, they will be told off into sections according to the capacity of the trucks.

The sections will be numbered off from the right of the squadron, and they will afterwards file from the most convenient flank, each halting opposite the truck marked with the number of the section. A quiet horse should be selected to go in first, followed by No. 1 of the front rank of each section, and then his rear rank man. Should a horse be very restive, backing him in will generally succeed.

As a rule, the first horse is to be led in and secured to the opposite side of the carriage, by the bridoon reins and the head collar rope, either to a ring placed for the purpose, or to the bars of the truck. The other horses will follow in order, each dragoon taking off the bridle bit, hanging it round the horse's neck, and leaving the truck the moment he has secured his horse.

The horses' heads, when it is possible, should be placed facing away from the second line of rails, as the horses are easily frightened by trains and engines passing. The moment the last horse is in, the door must be at once shut, and the fastenings of the trucks afterwards carefully examined by a railway official.

A non-commissioned officer and a couple of intelligent men from each troop, previously told off for the purpose, will go round and examine the fastenings of all the troop horses, and make such alterations as may be necessary under the personal superintendence of the troop officers.

When all the horses of a section have been embarked, the men, should at once proceed to the spot where they have left their arms, cloaks, &c., which they will resume and fall in; they will also be desired to remember the number and position of the truck containing their horses, and to fall in, in front of it, when they are ordered to disembark.

In a lancer regiment, certain men previously told off will collect the lances, and deposit those of the leading troop in the front luggage van, and those of the other troop in the rear van.

The embarkation and disembarking of the officers' chargers from the horse boxes should go on simultaneously with that of the troop horses, but if possible at a different part of the station.

When the arrangements before detailed are properly carried out, the train can be ready to start in half an hour from the time of beginning to load. Even less time will be sufficient for unloading.

No hay or straw should under any circumstances be left amongst the horses; all forage required that cannot be obtained on the road should be taken in closed-up waggons.

The closer horses are packed together in the carriages the better.

Despatch of Artillery by Rail.

On the arrival of the battery at the station it should be drawn up in the nearest convenient spot. The men will dismount, and after being permitted to fall out for necessary purposes, will then be formed up two deep, take off their packs (if horse artillery, their swords), and, some convenient place being selected, will lay them on the ground in the order they stood in the ranks.

The horses will then be unhooked, the traces hooked over their backs in the usual manner, and told off in sections according to the capacity of the cattle trucks; each section will then file off to the truck allotted to it, under the direction of the officer commanding the division, and be embarked in the same manner as laid down for cavalry. The gunners will assist the drivers in the embarkation of the horses, and on the conclusion of this duty the whole will proceed to embark the *matériel.*

In embarking the guns, waggons, and carriages, trucks loading from a dock are, if possible, to be used; when, as is the case on some railways, the ends of these trucks let down and meet, the carriages of the battery may be run on from one to the other in a few minutes. These trucks, however, are not so convenient when there are no docks or other facilities for unloading, and should in such cases be avoided.

Trucks having sides letting down are next in point of convenience; and lastly, low-sided trucks. Most of these take conveniently a gun or waggon with its limber.

Carriages must, when loaded from a dock, be run on to the truck unlimbered. The wheels must be well secured with lashing rope and scotches, the latter being generally procurable at railway stations. Should there be hay on the waggons it is not to be suffered to remain during the journey, but must be placed in a luggage van.

Low-sided trucks are found on most railways; the loading on these requires more manual labour than on other trucks, as it is necessary to lift the carriage over the sides by main force. The gun (or waggon) and its limbers are to be placed on the truck with the trail (or perch), and the shafts pointing inwards and resting on the floor.

There are some trucks on which more than a gun and limber may be placed, reference being always had to the weight which they are calculated to bear. In loading, the gun should first be placed on the truck close to one end, the trail on the floor; then its limber is to be backed upon it as close as possible, the shafts resting on the floor; the waggon limber is then to be placed on the truck the reverse way to the first limber and its shafts elevated. Finally, the waggon body is to be embarked, perch pointing inwards and resting on the floor.

This mode of conveyance requires much lashing, and these large trucks are not recommended when others can be obtained. When used, they should, if possible,

be loaded at the end, as the operation when performed from the platform is most laborious.

No projections, whether guns, shafts, or spare wheels, are on any occasion to extend beyond the buffers.

The carriages being embarked and secured, the gunners will take up their knapsacks (or swords), and the whole detachment fall in two deep and be told off in squads corresponding to the capacity of the compartments of the railway carriages; care being taken that one non-commissioned officer at least should be in each compartment; and, in cases where this is not practicable, the senior soldier is to be placed in charge.

An infantry battalion on war establishment will be carried in two trains as follows:

Left wing, one train.	For forage, baggage, &c.	1 Luggage-van with break.
	„ 15 Officers	1 First class carriage.
	„ 533 Men	17 Second or third ditto ditto.
	„ 3 Officers' chargers	1 Horse-box.
	„ 24 Draught-horses	3 Cattle-trucks.
	„ 3 G.S. waggons	3 Carriage-trucks.
	„ 1 S.A.A. cart	1 „ „
	Total	27 Railway carriages.

Right wing, one train.	For forage, baggage, &c.	1 Luggage-van with break.
	„ 16 Officers	1 First class carriage.
	„ 533 Men	17 Second or third ditto ditto.
	„ 7 Officers' chargers and hospital mule	3 Horse-boxes.
	„ 24 Draught-horses	3 Cattle-trucks.
	„ 2 G.S. waggons	2 Carriage-trucks.
	„ 2 S.A.A. carts	1 „ „
	Total	28 Railway carriages.

A regiment of cavalry on war establishment will be carried in four trains each as follows:

One squadron with proportion of regimental head-quarters, one train.	For forage, baggage, &c.	1 Luggage-van with break.
	„ 7 Officers*	1 Composite carriage.
	„ 155 Men	5 Second or third class ditto.
	„ 20 Chargers†	7 Horse-boxes.
	„ 120 Troop-horses	17 Cattle-trucks.
	„ 12 Draught-horses‡	
	„ 3 G.S. waggons◊	3 Carriage-trucks.
	Total	34 Railway carriages.

* With one squadron there will only be 6 officers.

† With one squadron there will be 19 chargers and the hospital mule.

‡ With one squadron there will only be 8 draught-horses.

◊ With one squadron there will be 2 G.S. waggons and 1 forge waggon, and with another squadron there will only be 2 G.S. waggons.

A battery of R.H.A. on war establishment will be carried in two trains each as follows:

For forage, baggage, &c.	1 Luggage-van with break.
„ 4 Officers*	1 Composite carriage.
„ 86 Men	3 Second or third class carriages.
„ 8 Carriages†	8 Carriage-trucks.
„ 82 Battery horses	11 Cattle-trucks.
„ 8 Officers' chargers‡	3 Horse-boxes.
Total	27 Railway carriages.

A 16-pr. battery of field artillery on war establishment will be carried in two trains each as follows:

For forage, baggage, &c.	1 Luggage-van with break.
„ 4 Officers§	1 Composite carriage.
„ 96 Men	3 Second or third class carriages.
„ 8 Carriages‖	8 Carriage-trucks.
„ 4 Officers' chargers	2 Horse-boxes.
„ 73 Battery-horses**	9 Cattle-trucks.
Total	24 Railway carriages.

A 9-pr. battery of field artillery on war establishment will be also carried in two trains, the number and description of railway carriages being the same as for a 16-pr. battery, except that only 8 cattle trucks for battery horses will be required with each train.

3rd. *The journey.*—The rate of travelling abroad is very slow for their heavy military trains: in Germany it is only from 15 to 18 of our miles an hour, in France between 17 and 20. With us the pace has been laid down at from 20 to 25 miles an hour. The short halts made to take in water and coal are included in these rates.

It is very essential to establish a low average speed, so that lost time may be made up for, by increasing it for short distances occasionally; for a quarter of an hour lost by any one train through some trifling accident would otherwise make itself felt throughout the whole column of trains, so as to disturb completely the time-table drawn up for the entire movement.

Every two or three hours, according to the total length of the journey, there should be a short halt of 15 minutes, and every eight or nine hours, a long halt of at least an

* Only 3 officers with one train.
† Only 7 carriages with one train.
‡ 7 Chargers and the hospital mule with one train.
§ Only 3 officers with one train.
‖ Only 7 carriages with one train.
¶ The hospital mule to go with these chargers.
** One of these battery horses to go in horse-box with chargers.

hour, for feeding both men and horses. In drawing up the time-table, these halts have to be calculated for, and the points selected where they are to take place. Plenty of sidings and good platform accommodation, and good supply of water, are the first necessities for these halting places, especially for those where it is intended to feed. Protection for the men from inclement weather is also most desirable.

The arrangements required for feeding the men at the selected places during a great movement of troops are considerable. On the manner in which they are designed and carried out much must ever depend.

At every such halting place, a military commandant is necessary, and the higher his rank the better, but under all circumstances he must be an able man, and carefully selected. He would be responsible that the necessary meals were properly provided for all ranks halting there. A large force of cooks, butchers, and bakers, organised under a commissariat officer would be required, to be told off into reliefs, so that there should be no check in the issue of food to the stream of men and horses passing through the place. Large cooking ranges would be required for this purpose if the journey was a long one, but under any circumstances, even in moving troops in Great Britain, it would be necessary to provide the men with hot tea or coffee.

At some stations during the late war, by introducing a jet of steam from a locomotive into the vessels containing the water and the coffee, it was prepared in the shortest possible time. Hot tea or a hot soup during a long journey is not only very palatable, but is almost a necessity for health, and keeps every one in good humour.

Horses take a long time to water in railway carriages, as each has to be watered from a bucket separately. Along each platform where troops are to arrive for a long halt, there should be at least 160 buckets kept always full for this purpose; upon reaching a feeding station, each officer having so many carriages under his charge during the journey, will see that this duty is properly carried out. Indeed, during all railway journeys, no matter what may be the arm of the service, the carriages should be divided equally amongst the subaltern officers, the captains going round to ascertain that everything is correct.

During great journeys it is desirable that at each long-halting place there should be a small hospital close to the station with a medical officer always in attendance.

The officer commanding at these halting places should be supreme on the spot, no officer, no matter what may be his rank, passing through, having any power to issue him orders, or interfere in any way with his arrangements. He must never leave the station whilst the operation is in progress, and he or his assistant must be present upon the arrival of every train, the officer commanding in each train reporting himself to him, and taking orders as to the time when the journey was to be resumed. If through any carelessness on the part of regimental officers, every one is not in the train at the exact minute indicated by the station commandant, the train must start all the same; if delays were permitted on account of absentees, the whole movement might be compromised. He will receive his orders direct from the officer in command of the line of communications by whom the arrangements for the operation had been made. He must be in all instances the channel of communication with the railroad officials, to

whom no orders are to be given on any subject by the officers travelling. Extra latrine accommodation at all important halting places should be provided.

The feeding of the locomotive is nearly as important as the feeding of the troops, and halting places must be selected with this object in view. An engine drawing a heavy load consumes about 100 cubic feet, or 660 gallons of water and about 8 cwt. of pit coal per hour.

The police duties at the halting places should be carried out under the station commandant's orders; no intoxicating liquor to be allowed for sale in or near the place. The station to be kept clear of spectators, and the strictest order and regularity to be maintained in it.

During the Fenian raids in Canada, troops had to be moved into districts infested by raiders: to prevent accidents to the loaded trains from the possible destruction of the line, a pilot engine carrying a staff officer was kept running ahead of the train so as just to be always within signalling distance, when nearing the enemy's vicinity, all proceeded at a walking pace. With the leading train was a telegraph operator, who carried a portable instrument and sufficient copper wire to connect it with the telegraph wires of the railway; each train was provided with skids to enable guns and horses to be disembarked at any spot. A detachment of railway workmen with 20 or 30 rails should be with leading train, in which there should be an officer of rank, and a railway official of authority of that particular line.

These precautions should never be omitted when there is just cause for apprehension.

4th. *The disembarkation* is very similar, as far as the arrangements required, to the embarkation. With infantry, enough men being left as a fatigue party to assist the drivers to unload their waggons and horses, the main body should be marched clear of the station, and halted on the nearest available open space on the route to be taken, where arms should be piled to await the arrival of the baggage, no straggling upon any pretence whatever to be permitted. As soon as the baggage comes up, the column to march at once for its destination, no halt being again permitted until well clear of the terminus, and adjoining town or village. The station commandant at point of arrival should give all commanding officers their orders, as to the mode of disembarkation and the arrangements to be made until each column gets clear of the place. Any block at the place of arrival is more serious even than at point of departure, for it must jam up all the trains in rear, thereby rendering accidents more liable, and throwing out all arrangements made for the operation. The station commandant must see that this is prevented, and that no troops are allowed to hang about the station or its approaches.

There is always during war a tendency on the part of administrative officers to make railroad stations depôts for their stores. Commissaries find railroad carriages very convenient places for their supplies. There is a great temptation to keep stores brought by rail, and not immediately required at the moment of their arrival in the carriages they come in. The zealous control officer, thinking naturally of his own department only, all his thoughts and energies being centred in his important duty of supplying the army with food and powder, begs of the staff officer to permit him to

keep his stores in their railroad carriages, until he has to issue or despatch them to the front.

Such requests must never be complied with; for to lock-up rolling stock as storehouses at a time when every available carriage is of consequence would be most imprudent, and to allow a station to be blocked up by an accumulation of carriages during military operations, would be the worst of folly. Storehouses for the reception of supplies should be obtained at some little distance from the station, and if possible, in a direction different from that to be taken by troops in their march to the front.

When moving troops with what I may call tactical objects in view, that is, moving them to the assistance of others already engaged (as, for instance, those pushed on to Frossard's assistance on the 6th August, 1870), where it is possible it may be necessary to disembark them at any moment, you must carry in each train skids, or some sort of brough for getting the horses, guns, and waggons off the carriages. Although the operation entails labour and requires time, it is a great advantage to be able to disembark at any point you choose, irrespective of railway stations. During the Fenian raids upon Canada, we had every train provided with broughs, and I saw a battery of artillery disembarked by their assistance in a very short time far from any station.

When the train reaches its destination, the officers will get out first, and the halt being sounded, the men will get out and fall in opposite their carriages. Cavalry or artillery will be marched to some convenient spot selected by the officer commanding at the station to deposit their arms, cloaks, or knapsacks.

The door of each truck is then let down, and a mat or loose straw, if it can be procured, spread upon it, the horse opposite the entrance is to be immediately bridled and led or backed out by the man to whom it belongs; the horses to the right and left following it in turn. The troops will then be formed up in the most convenient place, and the horses again held until the arms, &c., are resumed and placed upon the saddle.

5th. *The march from the point of leaving the train to the camp or bivouac.*—In any great movement it is necessary to run trains by night as well as day. Troops of all arms will thus reach their destination at all hours of the night. As night marches are to be avoided if possible, much will depend upon the nature and objects of the operation in progress, and upon the locality at the point of disembarkation in arranging for the disposal of the troops arriving at night. It is absolutely necessary that they should move away from the station, to prevent a block in the movement in rear, yet to move them any distance, especially if there is no moon, is a difficult operation. During the long days and fine weather of summer, it is easy to provide for the bivouac of the corps arriving; but during the long nights and inclement weather of winter, it is a difficult matter to arrange. Cavalry and artillery should, as a rule, be despatched so as to reach the point of disembarkation at least two hours before dark in the evening, or not earlier in the morning than about an hour before daybreak; the troops arriving in the night between those two hours to be infantry. If the weather is at all fine, infantry arriving at night can be marched into any field, ordered to pile arms and lie

down, a few drivers standing by the transport horses that are left hooked-to if the night is too dark to unhook and picket them to their own waggons. But with cavalry or artillery it is hopeless to think of any arrangement except that of every man standing by his horse all night when it is very dark, a duty that is very wearing to strength, trying to the temper, and depressing to the spirits, as all who have seen it tried know full well.

The general rule would naturally be in all great strategical movements, to collect each division or at least each brigade together within a few miles of the place of disembarkation, so that it should march complete to the general rendezvous or point of concentration.

Electric Telegraph.—We were the first nation that used it in the theatre of war, a wire having been run down to our trenches before Sebastopol. During the Indian mutiny, the wires uniting us with Calcutta followed close upon our heels, so close that I have seen the workmen when laying it actually under a fire of canister. A careful study of the late wars in America and Bohemia will give the student an idea of its immense value in military operations. In future, a regular signal corps, under charge of an engineer officer, will take the field with an English army, to act under the orders of the Q.M.G., or chief of the staff, the care of the instruments and the working of the line being under the superintendence of the C.R.E. No attempt will therefore be made here to describe the various processes for laying or fixing a line of wires.

All cavalry raids made upon the enemy's communications or into his territory should be accompanied by a skilled operator, who should be provided with a pocket instrument and a small supply of copper wire, and when the enemy's language is different from yours, by a supply of ribbon paper and the instrument for recording the messages on it.

Thus provided, an officer commanding a cavalry detachment that has got into the enemy's rear, can, by tapping the wires at any place, learn the messages that are going over them, and perhaps in that way the plans that are being made to capture his party. In many instances the Southern commanders having seized some telegraph station in their enemy's rear, sent orders in the name of Northern generals to various posts, directing them to move so as to fall into a net prepared for them ; trains of supplies of which they were in great need were thus secured. To prevent such tricks being played upon you, a secret signal, to be frequently changed, should be determined upon, without which no orders are to be obeyed. It is necessary that the operators should not even know that such existed. For instance, for the month of June, it may be arranged that each message should begin or end or both, with a word of five letters, for the next month with a word of six letters, or that the third word in the message should be of so many letters, &c., &c. The secret to be communicated only to officers commanding posts.

To Destroy Telegraph Line.—Pull down a pole so as to get at the wire, and then cut it in several pieces: the more poles destroyed the better. This is, however, easily repaired. An admirable plan for destroying communications is by means of non-conducting wire having the outward appearance of the ordinary wire in use. Being furnished before starting with some of this wire, and the tools used in repairing telegraphs, send a man experienced in such work up a pole, and let him there cut the wire close to it, uniting it again by the non-conducting wire spliced on in the usual manner. This should be done at several places along a line, and always at a pole. The result will be that, although all galvanic communications will have ceased, a man merely marching along the line shall not be able to discover where the break exists; one must go from post to post with an instrument to test each intervening portion of wire before the exact spot can be ascertained. It is advisable that a pole here and there should also be destroyed, and the wire cut, so that it should be supposed at first that the interruption simply resulted therefrom.

Signalling.—It is to be hoped that in future all officers will have to go through the regulated course of signalling before they graduate at the Staff College. The system is so simple that it might be advantageously included amongst the subjects upon which regimental officers are examined previous to promotion. It is of great importance that outposts should be able to communicate by signals with the main body, and that officers in charge of patrols, reconnoitring or flanking parties, advanced or rear guards, should have the power of rapidly communicating to the general what they observe, or the intelligence they may obtain. Sending messages by mounted men is always liable to accidents, and at best is but a tedious process. At times, circumstances may preclude the possibility of doing so.

During an action or the execution of movements in presence of an enemy, orders can be sent with rapidity and silence, by night or by day, to the several detached corps by means of the new system of signalling. By its means communications can also be maintained between the troops ashore and the fleet.

Communication by means of the system of flag signals described farther on, was kept up between the main body and the flanking parties whilst advancing upon Fort Garry in 1870: it worked well, and was of great use.

The electric telegraph is, during war, constantly liable to interruptions, so it is essential to have the power of supplementing it by a system of signalling that is independent of all elaborate apparatus.

The mode of signalling adopted is by a combination of short and long flashes, or appearance of any given object with proper intervals or obscurations between them, which are made by visual apparatus, such as revolving shutters or disc, collapsing

cones, flags, banderols, jets of steam, &c., by day; by lamps or lights at night; and by a combination of short and long sounds made with a fog horn, bugle, or steam whistle, in fogs, or when visible symbols are not available.

The appearances of the object are termed 'flashes,' and are of two lengths, termed respectively 'short' and 'long' flashes,—sometimes also called 'dots' and 'dashes,'—which, separated by obscurations, are used in combination to express the signs required, and are usually written thus:

▬ to express the short flash or dot,
▬▬ „ long flash or dash,

the interval of obscuration, or of the disappearance of the object being left blank.

At night these signals are in all cases made by the obscuration and exposure of a single light; in the daytime by the different apparatuses which may be employed.

At short distances no special apparatus is necessary, the simple waving of the arm with a hat, flag, handkerchief, &c., being sufficient.

This signalling without apparatus is that which should be practised by officers and N.C.O.s. When it is possible so to do, the handkerchief should be placed on the end of a stick about 6 ft. long.

The flashes are made with the arm, or with a flag as described above, in the following manner.

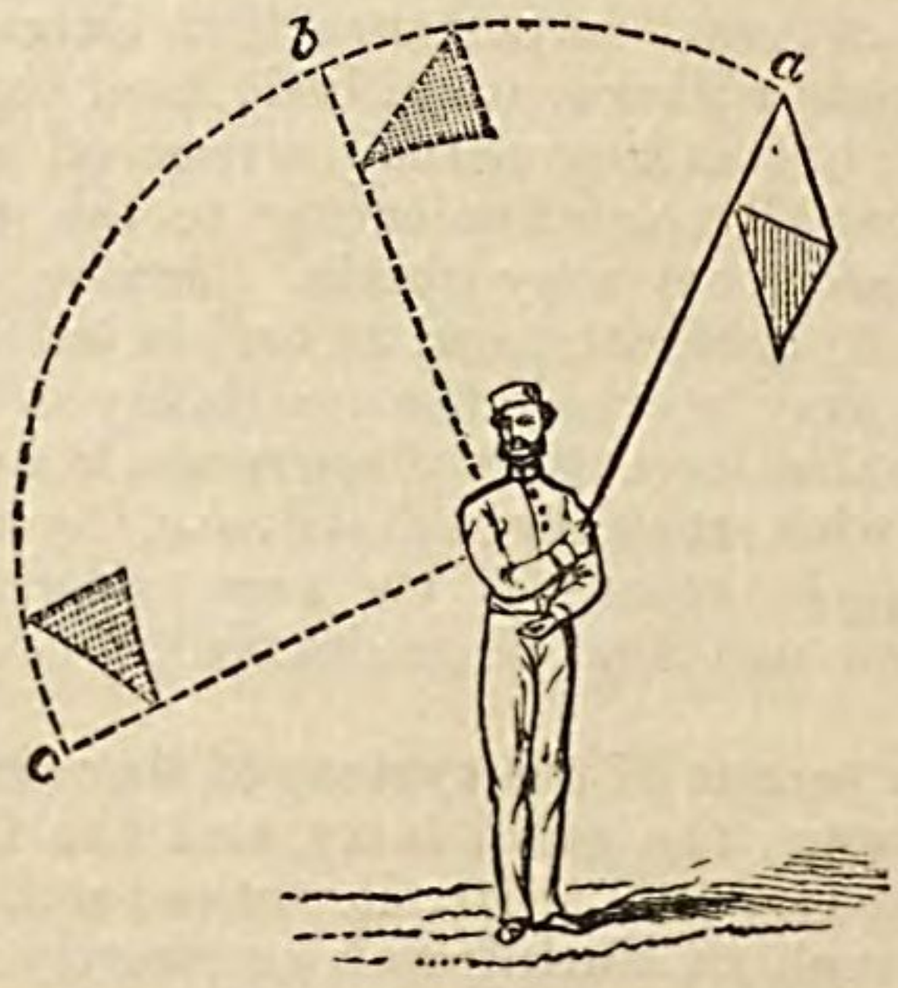


Fig. 53.

The signalman may work from left to right, or from right to left, as shown in the figure according to convenience and the direction of the wind. To make a short flash, the flag is waved from *a* to *b*, and back to the normal position *a*. To make a long flash, the flag is waved from *a* to *c*, and back to the normal position *a*.

The numerals 1 to 5 are, therefore, denoted by one to five waves of the flag from *a* to *b*, recovering to *a*. The numeral 6 by a wave from *a* to *c*, recovering to *a*. The numeral 7 by a wave from *a* to *b*, back to *a*, and then to *c*, recovering to the normal position *a*. The numeral 8 is denoted by a wave from *a* to *c*, back to *a* and then to *b*, recovering to the normal position *a*. The numeral 9 is denoted by two waves from *a* to *b*, and one from *a* to *c*. The numeral 0 by one wave from *a* to *c*, recovering again to *a*, and then two waves from *a* to *b*. The other signs are made in the same manner, so that a short motion shall always represent a short flash, and a long motion a long flash.

On the completion of the motions required for each sign, the flag must always be brought to the position *a*. When the word, or group of figures, is completed, the butt of the staff may be brought to the ground, and the flag at the same moment gathered in.

In receiving a message, the flag should always be kept in the position *a*, except when answering.

Messages can be sent either by means of the signals laid down in the 'ARMY AND NAVY SIGNAL BOOK,' lately compiled by authority, or by spelling the words according to the alphabet given below, or by using the Morse Alphabet when communicating with telegraph stations unprovided with the code. It is, I think, very much to be regretted, that the Morse Alphabet has not been adopted for the code, as it is now in general use for telegraph purposes. At present a good signalman must know the two systems, a necessity that makes the art difficult to acquire.

It being advisable to keep the signal book as secret as possible, it will only be in possession of a few, so that for common work the alphabet will be used. 'The symbols and numbers expressing the alphabet are identical with those forming the alphabet in the signal book.'

Preparative . . . . ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬, &c.

(A continued succession of short flashes.)

Spelling prefix . . . . . ▬ ▬▬ ▬▬ ▬

Stop . . . . . ▬▬ ▬▬ ▬▬ ▬▬ ▬▬

(A continued succession of long flashes.)

General answer . . . ▬▬ ▬ ▬▬ ▬ ▬▬ ▬ ▬▬ ▬, &c.

(A continued succession of long and short flashes alternately.)

1 ▬	6 ▬▬
2 ▬ ▬	7 ▬ ▬▬
3 ▬ ▬ ▬	8 ▬▬ ▬
4 ▬ ▬ ▬ ▬	9 ▬ ▬ ▬▬
5 ▬ ▬ ▬ ▬ ▬	0 ▬▬ ▬ ▬

1 Understood. ▬	2 Not Understood. ▬ ▬	A 5 ▬ ▬ ▬ ▬ ▬	3 Numeral. ▬ ▬ ▬	4 Wait. ▬ ▬ ▬ ▬
B 6 ▬▬▬	C 7 ▬ ▬▬▬	D 8 ▬▬▬ ▬	E 9 ▬ ▬ ▬▬▬	F 10 ▬ ▬▬▬ ▬ ▬
G 11 ▬ ▬	H 12 ▬ ▬ ▬	I 13 ▬ ▬ ▬ ▬	J 14 ▬ ▬ ▬ ▬ ▬	K 15 ▬ ▬ ▬ ▬ ▬ ▬
L 16 ▬ ▬▬▬	M 17 ▬ ▬ ▬▬▬	N 18 ▬ ▬▬▬ ▬	O 19 ▬ ▬ ▬ ▬▬▬	P 20 ▬ ▬ ▬▬▬ ▬ ▬
Q 21 ▬ ▬ ▬	R 22 ▬ ▬ ▬ ▬	S 23 ▬ ▬ ▬ ▬ ▬	T 24 ▬ ▬ ▬ ▬ ▬	U 25 ▬ ▬ ▬ ▬ ▬ ▬
V 26 ▬ ▬ ▬▬▬	W 27 ▬ ▬ ▬ ▬▬▬	X 28 ▬ ▬ ▬▬▬ ▬	Y 29 ▬ ▬ ▬ ▬ ▬▬▬	Z 30 ▬ ▬ ▬ ▬▬▬ ▬ ▬

Stop or end of word ▬▬▬ ▬▬▬ ▬▬▬ ▬▬▬, &c.

NOTE.—This signal is repeated twice at end of message.

In communicating with the Navy not more than two letters are to be sent in one group, and the numbers 1, 2, 3, and 4 are not to be used, the Naval Answer being ▬ ▬▬▬ ▬▬▬ ▬ ▬▬▬ ▬ ▬▬▬ ▬ ▬▬▬ ▬ ▬▬▬.

THE MORSE ALPHABET.

A	▬ ▬▬▬	N	▬▬▬ ▬
B	▬▬▬ ▬ ▬ ▬	O	▬▬▬ ▬▬▬ ▬▬▬
C	▬▬▬ ▬ ▬▬▬ ▬	P	▬ ▬▬▬ ▬▬▬ ▬
D	▬▬▬ ▬ ▬	Q	▬▬▬ ▬▬▬ ▬ ▬▬▬
E	▬	R	▬ ▬▬▬ ▬
F	▬ ▬ ▬▬▬ ▬	S	▬ ▬ ▬
G	▬▬▬ ▬▬▬ ▬	T	▬▬▬
H	▬ ▬ ▬ ▬	U	▬ ▬ ▬▬▬
I	▬ ▬	V	▬ ▬ ▬ ▬▬▬
J	▬ ▬▬▬ ▬▬▬ ▬▬▬	W	▬ ▬▬▬ ▬▬▬
K	▬▬▬ ▬ ▬▬▬	X	▬▬▬ ▬ ▬ ▬▬▬
L	▬ ▬▬▬ ▬ ▬	Y	▬▬▬ ▬ ▬▬▬ ▬▬▬
M	▬▬▬ ▬▬▬	Z	▬▬▬ ▬▬▬ ▬ ▬

Preparative, stop, and general answer are the same as in the code.

Repeat and Interrogative, ▬ ▬ ▬▬ ▬▬ ▬ ▬.

He should make the signals in a precisely similar manner to that in which he makes the numbers in signalling, pausing between each letter as he does between each figure, and treating each word as a number. He should never commence any word after the first until he has received the "Answer" from the receiving station to indicate to him that the word is understood.

With this code great expedition may be obtained in the transmission of messages to stations where the operators are very expert; but very constant practice is necessary on the part of the operators to enable them to transmit and receive messages accurately and quickly.

CYPHER.—It is most important to be able to transmit messages in writing, or by electric telegraph, or by signals, by means of a cypher unintelligible to those unprovided with the key. An admirable plan for doing so is described in the 'ARMY AND NAVY SIGNAL BOOK,' but as it is rather too complicated to be generally remembered, the following simple plan will answer all outpost purposes. Divide a square into 25 spaces, and number them as below.

1 M	2 A	3 J (I)	4 E	5 S
8 T	9 Y	10 B	11 C	6 D
7 F	12 G	 H	12 K	7 L
6 N	11 O	10 P	9 Q	8 R
5 U	4 V	3 W	2 X	1 Z

This method of numbering them, and the key-word, is all that one has to remember, so that when a message in cypher is received, one has only to draw roughly in pencil a square as above, and number the divisions in the

same way. The key-word can be changed daily or whenever it is considered necessary. It should be a word of at least six or seven letters, and must not have any letter repeated in it. In the diagram given, the word 'MAJESTY' is the key. The letters composing it are accordingly spelt along the spaces from left to right, beginning at the left-hand top corner. The succeeding spaces are filled with letters thus: the space following that on which is written the last letter of the key, is marked with the letter A: or if that letter is contained in the key-word, then the letter nearest it in the alphabet in order of sequence, which may not be in the key-word, and so on through all the spaces. For example, after the Y of 'majesty,' the next letter is B, because A is in that word and B is not; then C, D, then F (E being in the key), and so on to Z.

Messages are written in this cypher as follows. For every required letter of the alphabet, having found in it the diagram, see the number of its space, and substitute for it in the message, the letter in the space having the corresponding number. Thus, I want to send the following message:—

WE ATTACK AT NOON.

It runs thus in cypher:—IVXRRXOGXRDCCD.

In using this cypher, it is not necessary to distinguish the ending of words by leaving a space after each, as thus there is less liability of its being decyphered if the signals are perceived by an enemy, or if the message falls into his hands in writing.

One letter will always be on the centre square, which has no number. Whenever, therefore, it may be necessary to use it, the true letter is used. With 'majesty' for a key-word, that letter is H.

To decypher a message, the process is merely the reverse of that described above. For example, the following message is received:—IVXRRXOGXRDCCD. I look out for I in the diagram, and find its number to be, 3, and that the letter on the space with the corresponding number is W, and so on.

The following cypher is also by a substitution of letters one for the other; it is somewhat more troublesome to use than that already described, but without a knowledge of the key it defies interpretation, as the same letter is represented by various letters at different parts of a sentence, word, or even syllable. It was used successfully during the Ashanti war. The key is any number that may from time to time be fixed upon, of seven or more figures, say 4,631,870. Let us suppose that the same message as above is to be sent in this cypher. Write under it (beginning at the first letter in the message) the key number, one figure under each letter in rotation, and keep on repeating the key number until there is a figure under every letter in the message. The substitution of letters is then determined as follows. The first letter W having 4 under it, you represent it by the letter that comes fourth after W in the alphabet,

but as there are only three, you add on as many letters as may be required from the beginning of the alphabet in regular order: A is therefore the substitute for W. The next letter, E, has 6 under it, and is represented by K, which is the sixth letter after it in the alphabet. The next letter, A, has 3 under it, and is therefore represented by D, the third letter after it, and so on, the whole sentence being as follows—

W E A T T A C K A T N O O N.
4 6 3 1 8 7 0 4 6 3 1 8 7 0.
A K D U B H C O G W O W V N.

The decyphering is merely the process reversed: whenever the figure 0 occurs, there is no substitution. Like the other cypher, the letters in a message should be written in an unbroken line, so as to give no key to the length of the words used.

Military Surveys.—It is taken for granted that officers understand the art of surveying; if not, let them ask a brother officer to teach them as soon as possible, and let them study Jackson's book on the subject.

No officer is fit to be upon the staff in war unless he can delineate the features of a country on paper. There is seldom a regularly recognised topographical department with us in the field, and the consequence is that surveys of the theatre of war are made by the officers of the Q.G.M. department attached to divisions, besides others made by officers of that department belonging to the headquarters. As was the case in the Crimea, there are also surveys made by the Engineers, and the result, after all, is seldom satisfactory. The army which took the field in China, in 1861, was about the best organised one we ever had in the field up to that date, and with it there was an officer of the Q.M. department especially detailed, with an officer as an assistant, a draughtsman, and an interpreter, for topographical purposes. It is essential, whatever may be the organisation, that it should form part of the Q.M.G. department, so that the officers be available for other purposes when required, such as reconnaissances, &c.

As soon as the staff is organised, it is most necessary that special instructions should be issued by the chief of the staff as to the descriptive terms to be used in reports of localities, positions, &c., when describing their physical features, and as to the manner in which they should be represented on paper. This is necessary to prevent confusion, for so many men have different styles of doing so, that a few clearly defined rules on these points are essential.

The best scales for field surveys are 2, 4, and 8 inches to the mile; and for an index plan, 2 miles to the inch; it is taken for granted that maps of about this last-named scale are in possession of all staff officers before the campaign opens. The object of the survey must always be held in mind; it is not to measure land for farming or building purposes, but to put on

paper a delineation of the country, showing all its features which affect military operations, and showing the distances with sufficient accuracy for all military purposes.

The instruments to be in every staff officer's possession are—the prismatic compass, marked off from 1° to 360°, and bronzed on the outside; a protractor (made for compass surveying, and divided for the 4-inch scale); a pair of folding compasses; a small colour box, with brushes, pencils, and a piece of india-rubber. A block sketch-book 9 in. square, with blue lines ruled parallel to one another, but at irregular intervals, is the best to draw upon. With each division in charge of the senior staff officer, there should also be a box sextant. Some one officer belonging to the topographical branch should have sole charge of all the triangulation work. He will commence by measuring a long base; and, working from it, will fix the positions of all villages and important points in his vicinity, extending his work as far to the front as possible. He can do this either with a pocket sextant resting on a stand, or with a small theodolite. With the steeples of churches or other remarkable points fixed, and their positions pricked off on the sketch-book, an officer filling in the details has only to observe two that subtend an angle of about 90° from where he is, and lay off the bearings from each of them on his book; where those bearings intersect is his position; in this manner the details of five or six square miles can soon be filled in. In doing so, he will make use of the style that he is best acquainted with, for some that use the vertical touch cannot do the horizontal one. It should be a rule with all employed surveying in the field, that the day's work is inked-in every evening. The author has had considerable experience, and he strongly recommends brush-work in preference to pen-work, as saving time and labour. All streams and water should be shown in blue ink, woods by a wash of green (Hooker's is the best).

Whilst surveying, the compass should be secured round the neck by a string, and carried in a breast pocket. It should have no cover; the glass should be strong, and the action of putting down the sight-vane flat on the glass should throw the needle out of gear. The pencil, a hard HHH., should be fastened by a string to the sketch-book, as should also the protractor and india-rubber.

In pacing distances, do not attempt to carry large numbers in your head; when you have counted 100, close the little finger of either hand; for the next 100, close the third finger, and so on until 500 is counted; for 600 open the little finger, and so on until all the fingers are again open, when 1000 will have been counted. Each 1000 paces should be at once noted in your book or on your sketch. When written down you begin again with another 1000.

Some prefer to measure distances in yards instead of the pace of 30 in. I have always paced in yards, and found from practice that I was much

less liable to error than when I measured distances in paces of the regulated length, and in plotting one's work on paper, the advantage is all in favour of using the yard.

To judge distances accurately is of great importance; every opportunity should be taken of practising the eye in doing so. Where there are telegraph poles in the direction you wish to know a distance, they are a great assistance, as they are from 50 to 80 yards apart, according to the country. Good eyesight can distinguish bodies of troops at 2000 yards; at that distance a man or horse appear like a dot; at 1200 yards cavalry is distinguished from infantry, and movements can be seen; at 900 yards they become clear; the motion of arms and legs is visible at 800, and the head appears as a ball at 650 yards.

In sketching the features of the ground, the one great guide is to observe the course the water flows in; stand on any little hill or mound, and in looking round you will see the marks left by the water of the last shower. In fact, a delineation of the natural drainage of any section of the country describes its features, and requires only little additions to make it into a good military map. Given to any one accustomed to sketching a ground, a plan showing the water-courses (which when drawn alone resemble a decayed leaf with its fibrous portions only remaining), the features can be sketched in with tolerable accuracy, although the draughtsman had never seen the country.

The groundwork of all surveying must be triangulation, and working from the large data down to small results and deductions therefrom. The more it enters into a survey, be it with or without instruments, the better will be the work. The more information you can convey on the face of a plan the better: it is far better to learn from the plan itself that such a bridge is of *wood*, or of 4 spans, &c., &c., than that you should have to search through an accompanying report for that information. The same thing as regards roads; it is easy to write along them *good, bad, macadamised, paved*, &c.

For rough sketches, when time is of importance, there is really only one style for military drawing: the touch is so simple that it requires no artistic powers, and although done with the greatest rapidity, is yet capable of being subsequently worked up and improved into a highly-finished sketch, either by pen or brush, the latter being the best. Here is a rough specimen. The writer has many times made sketches in this way on horseback, taking care to fill in particulars and improve them as soon as possible.

"The scale of shade," lately introduced into our army, is good in theory, but very bad in practice: the more neatly rolling features of ground are represented in it, the more difficult it is for those studying the sketch to ascertain what is a range of elevated ground, and what is a ravine: it is

a theoretical attempt to enable officers who have no naturally artistic powers to delineate ground on paper; it has not only failed to accomplish this object, but the result has been that those who can draw are taught to sketch in a manner that is puzzling and nearly useless. I strongly recommend officers to sketch in the old fashioned horizontal method.

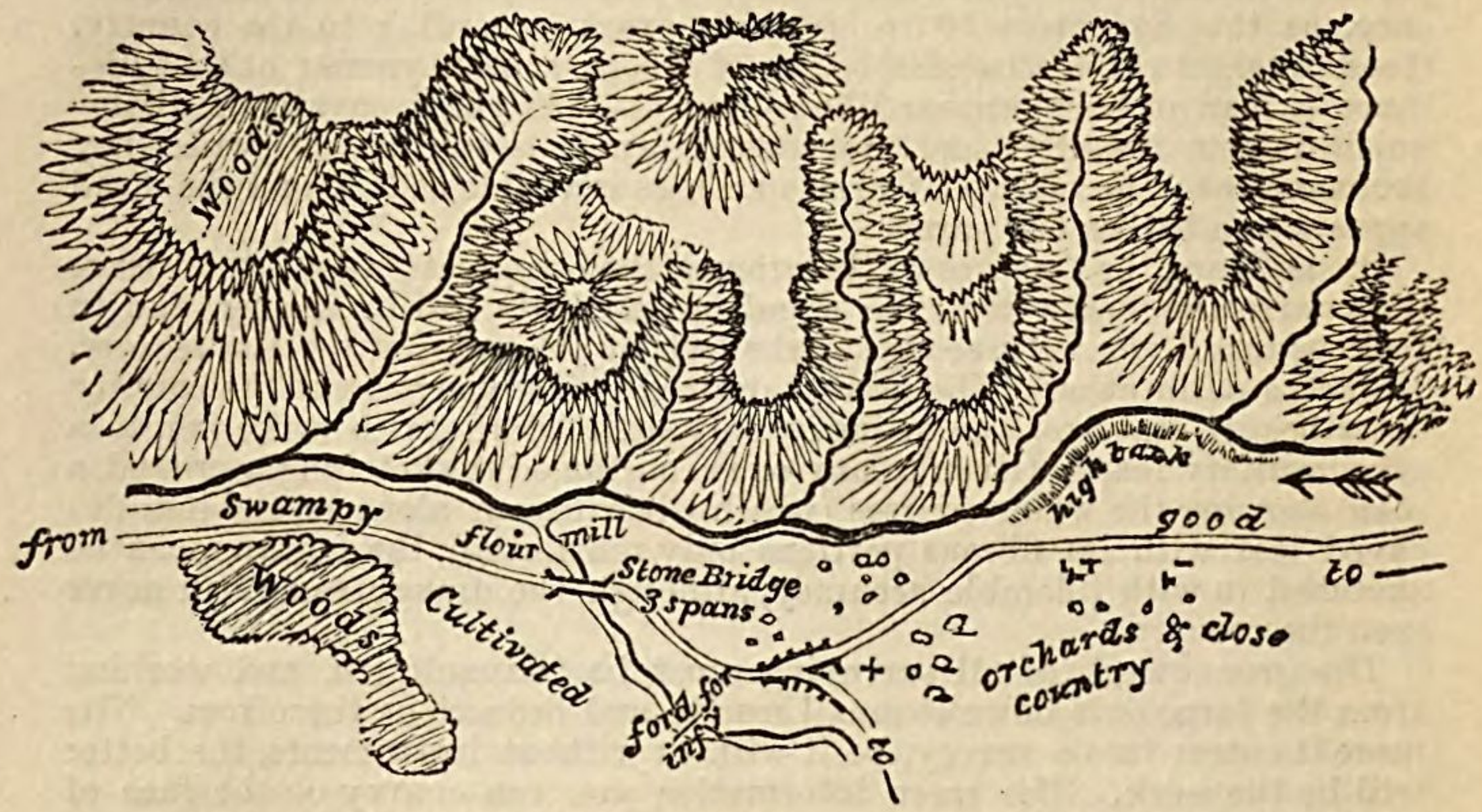


Fig. 54.

Attached to the topographical department there should be a light cart or waggon with two wheels, 15 ft. in circumference, fitted with a dial arrangement to measure distances as the cart went along. It should carry the papers, instruments and materials for the department, and could thus be made to fulfil two purposes. A corporal or sergeant as draughtsman and clerk should accompany the cart on the march, and make a regular traversed sketch of the road, taking the distance from the dial. In this manner a series of bases will be obtained according as the army advances.

The variation of the compass should be constantly checked by finding the true meridian. The simplest method is by the polar star; the intersection of the dotted lines may be taken as the true north for all practical purposes. The illustration shows the position of the stars in the Great Bear. Erect a pole anywhere, and at the distance of a couple of hundred yards have another put up, so that the two are in a line with the true

north; the variations of your compass can be ascertained the next morning by taking the bearing of one pole from the other.

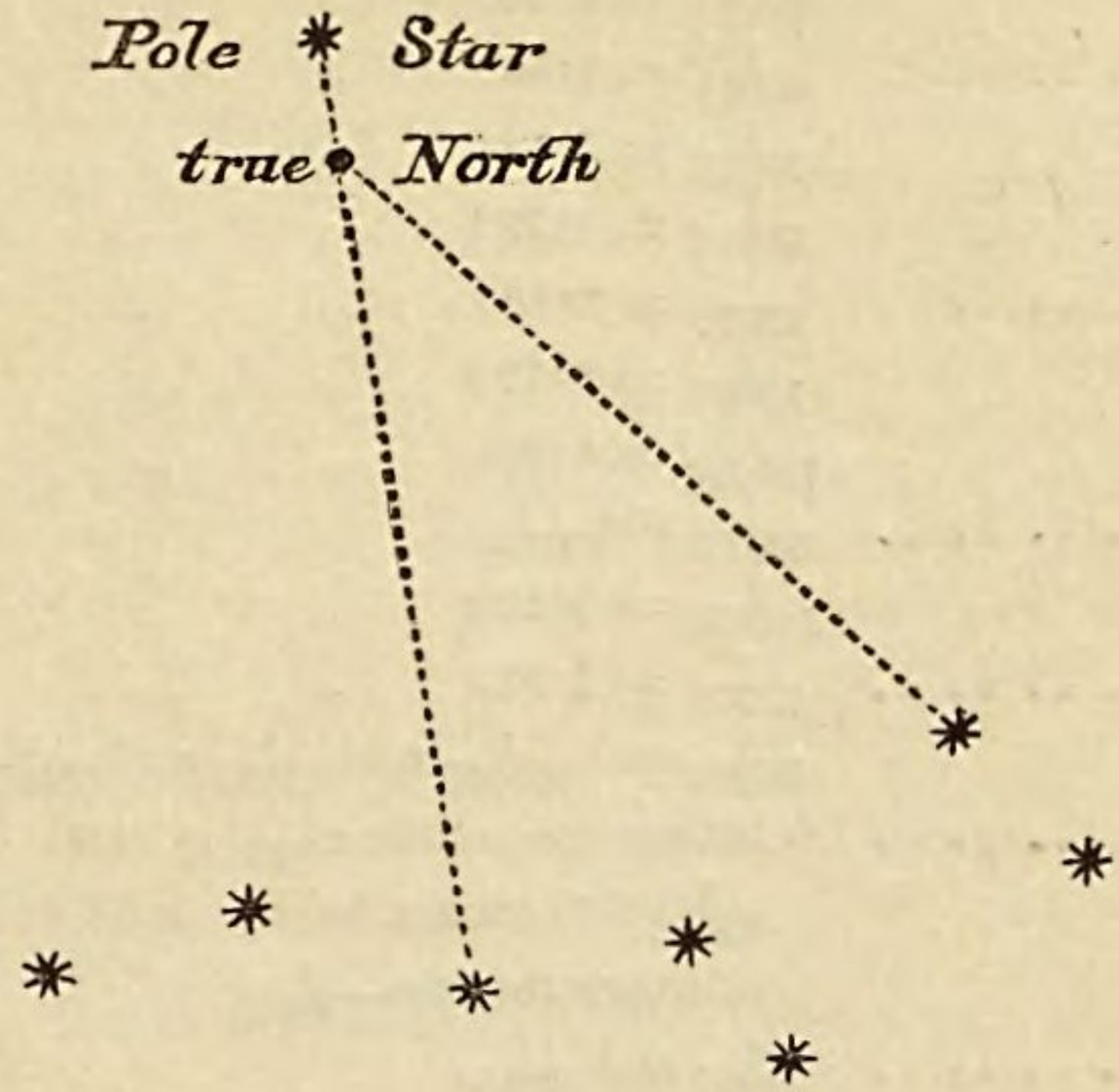


Fig. 55.

When time admits, avail yourself of every possible opportunity of taking accurate bearings and angles from all church steeples and high ground, as well towards the rear as the front.

Scales.—Continental nations indicate the scale upon which a map is drawn by the fraction that any linear distance measured thereon is of the actual distance on the ground. This is a little puzzling to us who are accustomed to scales of so many miles to the inch, or of so many inches to the mile. When obliged to use a map with a fractional scale, you should at once construct a scale for it of British miles. To do so, you have merely to divide 63360 (the number of inches in a mile) by the denominator of the fraction of the scale to ascertain the number of inches it is to the English mile. Thus a scale of $\frac{1}{80000}$ is 0·792 inches to the mile, because $\frac{63360}{80000} = 0{\cdot}792$. With a scale divided to hundredth parts of an inch, mark off 79 parts and you have one mile on the map. It is easy to divide that distance into four parts to give you quarters of a mile.

The scales used for military maps in Europe are as follows:

Austria	$\frac{1}{14400} = 4{\cdot}4$	inches to the mile.
	$\frac{1}{28800} = 2{\cdot}2$	" "
	$\frac{1}{86400} = 0{\cdot}733$	" "
Belgium	$\frac{1}{20000} = 3{\cdot}168$	" "
	$\frac{1}{40000} = 1{\cdot}584$	" "
	$\frac{1}{80000} = 0{\cdot}792$	" "
Denmark	$\frac{1}{20000} = 3{\cdot}168$	" "
	$\frac{1}{80000} = 0{\cdot}792$	" "
	$\frac{1}{160000} = 0{\cdot}396$	" "
France	$\frac{1}{80000}$ and $\frac{1}{40000}$.	
	$\frac{1}{320000} = 0{\cdot}198$	" "
Germany	$\frac{1}{25000} = 2{\cdot}534$	" "
	$\frac{1}{50000}$ and $\frac{1}{100000}$ and $\frac{1}{80000}$ and $\frac{1}{200000}$.	
Great Britain	6 inches to a mile $= \frac{1}{10360}$, and 1 inch to the mile $= \frac{1}{63360}$: 4 inches to the mile is a common scale for military maps $= \frac{1}{13892}$.	
Holland	$\frac{1}{25000}$ and $\frac{1}{50000}$.	
Italy	$\frac{1}{86400}$ and $\frac{1}{50000}$ and $\frac{1}{25000}$.	
Russia	$\frac{1}{84000} = 0{\cdot}754$	inches to the mile.
	$\frac{1}{126000} = 0{\cdot}508$	" "
Spain	$\frac{1}{60000} = 1{\cdot}056$	" "
	$\frac{1}{100000}$.	
Sweden and Norway. .	$\frac{1}{20000}$ and $\frac{1}{100000}$ and $\frac{1}{200000}$.	
Switzerland	$\frac{1}{25000}$ and $\frac{1}{50000}$.	

Form of Report for an Itinerary.—I have found from a considerable experience of military reports, accompanied by sketches, that the simplest forms are the best; most of the elaborate ones given in books were designed by men who never conducted a reconnaissance in war. As you open your metallic paper pocket-book (size 7 in. × 4 in.), let the left-hand page be ruled into squares, a quarter of an inch in the side, so that if your scale is an inch to the mile, each square is 440 yds. × 440 yds. Mark along right-hand edge of page, 1, 2, 3, 4, and so on, at every inch, so that the distances in miles may be distinguished at once. If there is plenty of time to prepare this book, it is a good plan to mark the mile lines in red ink, so that a glance at the paper shows you the distance upon it. Begin your sketch at lower end of page, working upwards, noting name of place

and hour of starting. Let your road wind about as it seems to do in reality, marking by compass the bearing of all villages one from another in degrees, read off a prismatic compass divided from 1° to 360°; do the same with all remarkable objects to right and left of the road, taking care to distinguish angles from distances by having the degree mark over them. Place your ordinary remarks, such as the time you reached particular localities, close to the edges of the paper; be very particular to note the number of minutes you halted at each place. Under the name of each village, note the number of inhabitants, and of houses, whether of stone, brick, or wood. Convey as much information on the sketch itself as you can do without interfering with the delineation of the features of the country. Keep the opposite page (ruled) for noting the information which you cannot put on your sketch, such as the name of postmasters, magistrates, leading residents, the best guides to be obtained, the supplies to be had, &c. Never trust your memory. Note in your book all you wish to remember, and ink it in every night after your march. In all reports, be careful to distinguish the information that is derived from your own observation from that obtained from the inhabitants; in the latter case name your authority, and state the amount of reliance that can in your opinion be placed upon it. The state of the weather during the march to be recorded. For the accommodation that houses and villages will afford, see page 177.

Field Fortification.—It is taken for granted that officers are conversant with the names of works, and the technical terms in permanent fortifications, and that they have a clear conception of the object of the art; also that they have been well instructed in the construction of shelter trenches, as now laid down in our drill books.

The works thrown up in the field, perhaps the work of a night, perhaps the labour of months, are rough imitations of the great fortifications constructed to defend cities: the principles are the same in both instances, but the materials required for their construction, and the time, are wanting in the field. Those principles must be borne in mind by the officer who has merely to throw up cover for his advanced post—they must never be lost sight of; they are as applicable to the defence of a farmhouse as to that of a capital. For anything like an extended system of defence, there will always be officers of engineers to lay down the general plan, and give the outlines of the works to be made, but it is a disgrace to any staff officer who knows less of the science than an engineer: he should be able to go carefully over all schemes for defence, to point out to his general the weak points, and to make propositions accordingly for modifying the projected works, &c. It may also be of moment occasionally for staff officers to design and carry out temporary works of defence. A few general memo-

randa will be given here for reference on this subject. The tracing must depend, 1st, on the configuration of the ground to be defended; 2nd, the object in view; 3rd, the time available for the construction, and the number of men to form the garrison.

Every preconceived notion must give way to the first consideration, which will indicate generally the outline to be followed. The following considerations must never be overlooked: No salient angle to be less than 60°; the re-entering ones to be from 90° to 110°, but never less than the former: for isolated works, their extent to be proportioned to the numbers intended for their defence, to be calculated roundly at a running yard of parapet to every two men, deductions being made for space occupied by artillery. The prolongation of all faces of works to be directed upon points where it is impossible to establish batteries, such as marshes, &c.

Apart from the local or immediate object in view, all works must provide, 1st, cover for the troops to occupy them; and 2ndly, must have their front well swept by their own fire, and that from other works or troops in their neighbourhood, to which again they should afford similar protection. In fact, the true test of the soundness or otherwise of any proposed scheme of defence is the aid and support its several component parts can mutually afford.

The objects in view when it is determined to throw up field works are so varied that I shall attempt no enumeration of them; they are to be found in every ancient and modern writer upon military history as of constant recurrence in every phase of a campaign. The time available must influence not only the profile to be given to the works, but also their tracing; for if there are only a few hours to spare, it is absurd to attempt enclosed redoubts, and so on; but in most cases the possibility of having more time than can be positively calculated on should be taken into consideration, and the works should be of such a nature as to be capable of constant further development.

PROFILE.—The minimum height of parapets of all well-finished field works constructed in a plain should be 8 ft. If the work is on ground much higher than all around it, the height may be less; if the reverse is the case, it must be much more: care to be taken that, not only are the men manning the front faces sheltered from fire, but that those standing on the banquette of the rear faces are so too.

For infantry who intend acting defensively, but who are to assume the offensive during an action whenever favourable opportunities show themselves, a bank of earth 3 ft. high, with a base 8 ft. or 9 ft., having a trench on each side of 5 ft. wide by 1 ft. 6 in. deep, is the best profile; a berme of 1 ft. should be left on both sides; 100 yds. of it can be easily thrown up by 100 men with two hours' fair work. In thus providing cover for men,

all material that is procurable on the spot that will add to the strength of the parapet, or which will increase the steepness of the interior slope, should be used, such as barrels, house furniture, logs of trees, turf, sods, hurdles, gates, rails, fences, &c. Every hour that men are left in such a breastwork, its defensible qualities ought to be added to, but in positions where it may be necessary to move cavalry or artillery to the front, care must be taken not to erect such a barrier in the form of a parapet that both those arms cannot easily cross. After fair cover from the enemy's view (which is the first consideration) has been obtained generally along the line of breastworks, and if time still admits of further work, it is better to devote all available labour to strengthening particular salient points, so that they should be as it were strong bastions to the rest of the line, which should be their curtains. If time permits, they may be made secure against capture by a sudden rush. As *points d'appui* they will add immensely to the strength of a position; however, it must be remembered that it is extremely dangerous to enclose any works in the rear. As a rule, they should be left open, so as to be seen into by other works or batteries, for the purpose of recapture from the enemy, should he succeed in getting into one.

If it is a question of constructing a square redoubt, the sides should not be less than 20 or more than 50 yards: in calculating the garrison for them, an allowance of 500 square feet for each field gun, and the same for the entrance traverse, must be allowed; the remaining superficial space, calculated in square feet within the foot of the slope of the banquette, divided by 20, will give the maximum garrison, but unless the parapets are most substantial, to put more than 300 men into any one enclosed work, would be to convert it into a charnel-house when the enemy has the power of bringing a heavy fire from field guns to bear upon it. The minimum garrison for a square redoubt of the minimum size is 80 men, to be disposed in single rank along the banquette and without artillery; the maximum garrisons for the largest square redoubt should not exceed 400, with 4 field pieces. If the number of men and guns to be enclosed in a field work exceed these limits, a redoubt with good flanking defence should be constructed. In all closed works, or

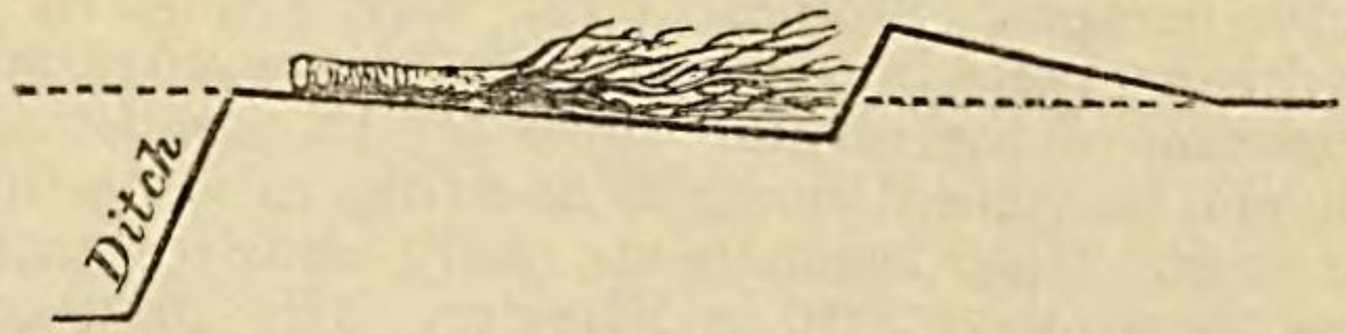


Fig. 56.

the portions of a long line that represent the bastions as it were, every effort should be made to render approach to them difficult: the most easily made, and the best obstacle, is that afforded by felled timber with the leaves and

small branches lopped off, the others being pointed and turned towards the enemy; if the trees are on the spot, they should not be cut more than two-thirds through, so that they cannot be dragged away. Wire fences are common now in many countries; they are invaluable as an obstacle in front of a work; all obstacles should be well under musketry fire; if they can be screened from the enemy's view or fire so much the better; this can be accomplished, when time admits, by placing them as shown in sketch.

Wire Entanglements were used to great advantage as obstacles by both sides in the last American war. They are constructed as follows. Drive stout stakes about 4 ft. long into the ground in quincunx order in 3 rows, so as to have about 2 ft. over the surface: unite them by strong wire (No. 12, or telegraph wire will do well) at from 18 in. to 2 ft. from the ground, the stakes being well notched to receive the wire. A work or battery surrounded by such an obstacle is difficult to storm.

The following data may be useful. Banquette to be 3 ft. for single, and 4 ft. 6 in. for double rank: slope to it, $\frac{1}{2}$: interior slope to be riveted, if possible the base being 1 ft. or 1 ft. 6 in.; the superior slope should never be less than $\frac{1}{4}$, but it ought to be $\frac{1}{6}$; exterior slope, $\frac{1}{1}$; berme, from 1 ft. to 3 ft. Escarp and counterscarp as steep as the soil will permit, and between 6 ft. and 12 ft. deep.

The thickness of the parapet must depend upon the nature of guns that are likely to be brought against it; from 10 ft. to 12 ft. along the superior slope is a fair thickness to resist field guns. The depth of the ditch having been fixed upon, its mean width can, of course, be determined by dividing the superficial area of a section of the parapet by the depth, as the sections of the ditch should about equal that of the parapet. To calculate the time that a certain ditch can be excavated in, if the ground can be dug without being picked, a man ought to dig a cubic yard an hour; if the pick is required, two cubic yards in three hours. If the depth of the ditch requires the earth to be thrown on a stage and from thence to the parapet, an additional number of shovelmen, equal to half of those in the ditch, would be required on the stage to forward on the earth to the rammers and shovellers on the parapet. Profiles of the work should be erected at all the angles by driving poles into the ground of the required height to represent the intersection of the several slopes of the parapet and banquette: these poles should be joined by sticks or string, so as to form a complete section of the work. Good rammers are easily made by cutting off, with a saw, logs from trees about 9 in. in diameter. The drainage of all works should be provided for when constructing them.

Field works should not be occupied by their garrisons until the enemy is actually in view. It is advisable to keep the men away from them as much as possible, and, unless surrounded by an enemy, the cooking at least should be carried on outside.

In selecting officers to command them, the greatest care and discrimination is necessary. Never allow an officer to be placed in such a position unless you know enough of him to have perfect reliance in him. To give a man command solely because he is senior officer is not only a folly, but a crime.

Destruction of Bridges.—Wooden ones can easily be burnt, if there is time. The Northerners used a small torpedo for destroying wooden bridges during their war. It is easily made, and can be carried by a mounted man. It consists simply of a bolt of $\frac{7}{8}$ in. iron, 8 in. long, with head and nut, the head to be 2 inches in diameter, and about 1 in. thick; a washer of same size as the head must be placed under the nut at the other end, with a fuse hole in it; between the washer and the head is a tin cylinder $1\frac{3}{4}$ in. in diameter, open at both ends, which is filled with powder; the washer and nut, when put on, form a case which keeps it in its place. A coat of varnish should be applied to exclude moisture. To use it, a hole 2 in. in diameter is bored in the timber, into which the torpedo is driven, head downwards, and the fuse ignited. The fuse should be about 2 ft. long. The explosion blows the timber to pieces, and, if it is a main support, brings down the whole structure. It is essential that the main braces or lower chords of truss bridges be chosen.

For masonry bridges, sink a shaft a few feet to one side of the middle of the roadway, down to the haunch of the arch, and drive a short gallery out from the bottom, so as to lodge the charge under the middle of the roadway: from 50 to 100 lbs., according to the thickness of the arch, will destroy nearly any bridge.

To determine the amount of powder the formula is $C = \frac{2}{3}\,L\,L\,R^2 \times B$; where C is the charge in lbs.; L L R the line of least resistance in feet, measured through the arch; and B the breadth of the bridge in feet. Except when the bridge is narrow, the charge had better be divided into two, to prevent the chance of blowing a hole through the centre, without bringing down the sides; there is a risk, however, in doing so, as it is difficult when hurried to arrange for the simultaneous discharge of the two charges together. If time presses, do not be sparing of your powder.

When time will not permit of your sinking a shaft to the haunch of the arch, a charge of 500 lbs. of powder placed in a trench 18 in. deep over the keystone of a semicircular arch of 26 feet span, $4\frac{1}{2}$ ft. thick, will break it in. The more earth and stones that can be piled up over the charge the better. Captain Schaw's rule for such demolitions is $C = \frac{3}{2}\,L\,L\,R^2 \times B$. (See preceding formula.)

When time is of consequence, preparations should be made in two places at the same time, one as already described, and the other over the crown of the arch, so that if, at last, from the near pursuit of the enemy, it is required to destroy the bridge before the haunch of the arch can be reached,

the demolition may be effected at the crown. When the side walls are lightly built, it is much better to drive in a gallery from the side, so as to lodge the charge against the haunch, as this does not interfere with the traffic over the bridge, is less liable to accident, and enables the powder to be kept dry for some time, if the mine is not required for immediate explosion.

If time permits, the powder should be lodged in a wooden box well tarred on the outside, or placed in a tarred sandbag—a sandbag will hold 50 lbs. of gunpowder. Powder hose burns at a rate varying from 10 to 20 ft. per second. Bickford's fuse burns at the rate of about 2 ft. per minute, and is not liable to damp.

DEMOLITION OF GATEWAYS.—A bag of 50 lbs. of gunpowder suspended to a gimlet screwed into the centre of any ordinary door or gate will, when exploded, blow it to pieces.

DEMOLITION OF GUNS.—With iron ones, half fill with powder, jam in a couple of round shot with nails, bits of iron, stones, &c., tamp up to the muzzle with stones, and a little earth, fire by means of a long fuse laid to the vent. The trunnions are easily broken off by a sledge-hammer, which renders a gun comparatively useless. Brass guns are easily destroyed by firing a shot from another gun into them behind the trunnions.

Mensuration and Useful Formulæ.

Circles.—Their areas are to one another as the squares of their diameters.

The diameter $\times$ by 3·1416 = circumference.

Circumference $\div$ 3·1416 = diameter.

Diameter $^2 \times$ ·7854 = area of circle.

Circumference $^2 \times$ ·07958 = area of circle.

The length of an arc = No. of degrees $\times$ radius $\times$ ·07145.

The area of the sector of a circle $= \frac{\text{radius} \times \text{arc}}{2}$.

The area of a segment is ascertained by finding the area of the sector, and subtracting from it the area of the triangle formed by the chord, and the radii of the sector, if the segment is less than a semicircle; if the segment is greater than a semicircle, then, by ascertaining the area of the smaller segment and subtracting it from the area of the whole circle.

Triangles.—The area $= \frac{\text{base}}{2} \times$ perpendicular height. When the three sides are known, and the area is required, subtract each side severally from half their sum; multiply those three remainders and the half sum together, and the square root of the product will be the required area.

In right-angled triangles, if the two sides forming the right angle are known, the hypothenuse = the square root of the sum of the squares of the two sides.

Given the hypothenuse and one side, the third side can be ascertained by subtracting the square of the known side from the square of the hypothenuse, and extracting the square root of the remainder.

The sums of the three angles of all triangles = 180°, so, if two angles of any triangle are given, the third is of course known by subtracting their sum from 180.

Let A, B, and C represent the three sides, and a, b, and c the three angles respectively opposite those three sides.

Given two angles (a and b) and one side B to find the other sides; $A = \frac{B \sin a}{\sin b}$ and $C = \frac{B \sin C}{\sin b}$. This is the rule commonly in use in measuring distances to inaccessible points, where you can measure a base by a tape line, and the angles at it by a pocket sextant.

Given the two sides A and B and the included angle c, the side $C = \sqrt{A^2 + B^2 - 2AB. \cos c}$.

The areas of all geometrical figures can be determined by the foregoing rules, by dividing them into triangles.

The cubic contents of boxes, rooms, &c., is arrived at by dividing them into triangular and rectangular figures, and multiplying the area of such by the height.

The area of a parallelogram = the length × the height.

Spheres.—Surface = diameter ^{2} × 3·1416 = diameter × circumference: the cubic content = diameter ^{3} × 0·5236. The cubic content of the segment of a sphere = ·5236 H ($H^2 \times {}^3R^2$), where H = height of segment, and R = radius of the base of segment.

Cones.—Surface = area of base + circumference of base × $\frac{1}{2}$ slant height. The surface of frustum = sum of girth at both ends × $\frac{1}{2}$ slant height + are a of both ends. The cubic content of cone or pyramid = area of base × $\frac{1}{3}$ perpendicular height; of a frustum = $\frac{1}{3}$ H ($A + a \sqrt{A \times a}$) when A and a = areas of the ends, and H = perpendicular height.

Cylinders.—Surface = area of both ends + length × circumference: cubic content = area of one end × length.

Wedges.—Cub. content is found as follows: to length of base × 2, add length of edge: multiply the sum by breadth of base, and by perpendicular height from base, and one-sixth of the product will be the cub. content.

PHYSICAL MEMORANDA.

Water.—1 cubic ft. = 62·5 lbs. = 6·25 gallons: 1 cubic in. = ·036 lbs.: 1 gallon = 10 lbs. = 0·16 cub. ft. = 276·48 cub. in: 1 cwt. = 1·8 cub. ft. = 11·2

gals.: 1 ton = 35·9 cub. ft. = 224 gals.: cub. ft. × 0·557 = cwt.: cub. ft. × 0·028 = tons: 1 cub. ft. of sea water = 64·25 lbs.: weight of sea water = weight of fresh × 1·028.

The mean velocity of water in rivers $= \frac{(\sqrt{V} - 1)^2 + V}{2}$, where V is the superficial velocity expressed in inches.

Air is 840 times lighter than water.

Velocity of falling bodies.—N = number of seconds in falling: S = space fallen through in feet: V, velocity in feet per second acquired in N seconds: $V = N \times 32{\cdot}166$ and $S = N^2 \times 16{\cdot}033$.

Animal power in lbs. raised 1 ft. per minute in 8 working hours daily:—The horse, 21,000; ox, 12,000; mule, 10,000; ass, 3500; man may be taken as 5·5th of a horse, or on an average at 3,800 lbs.

Velocity of sound through the air at a summer temperature is about 1142 ft. (say 365 yds., a number easily remembered), and through water about 4950 ft. per second: distances can be measured with tolerable accuracy by counting the number of seconds between the flash and report of a gun.

The pulse, in health, beats from 72 to 75 times in a minute.

Measurement of distances to inaccessible places without instruments.—A B the breadth of a river is required: produce A B to any convenient distance

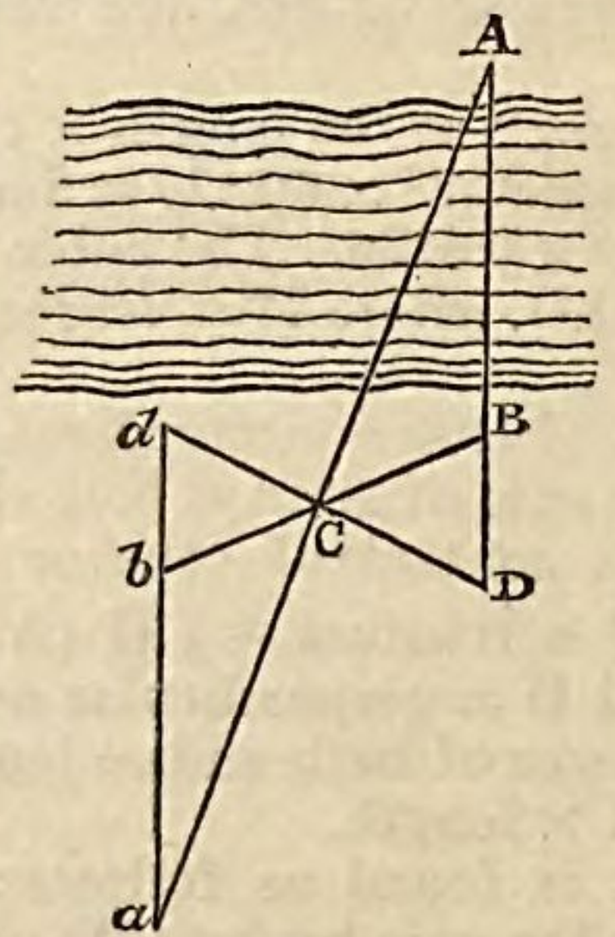


Fig. 57.

D: from D mark off in a convenient direction equal distances D C and C *d*: join B and C and produce the line until *b* C = C B: join *d* and *b* and produce the line until A C produced intersects it: measure *a b* and the result be the distance A B.

With a prismatic compass.—Measure a base C D and from its extremities plot on paper the lines A D and A C: their intersection will give A: the distance A B can then be measured by the scale upon which the base was laid down at. If time permits, it is better to lay off the base so that B bisects it, and the angles A D B and A C D should be about 60°; this is arriving at the distance by construction. To do so by calculation, the angles A D B and A C B should be measured by either the pocket sextant or the prismatic compass, and the required distance obtained by the formula given already regarding triangles.

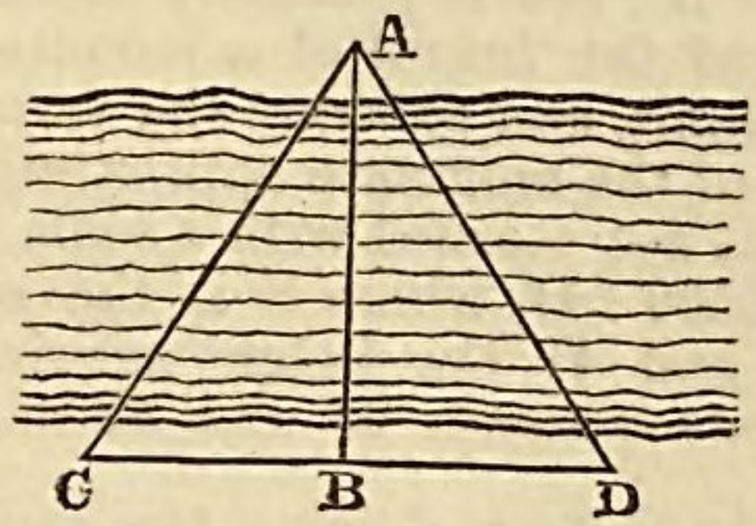


Fig. 58.

To measure the distance between two inaccessible points, measure a base, and find out, as described above, the distance between its extremities and both the points, which will give the two sides and included angle of the triangle that has the required distance for its base, and one of the extremites of the measured base for an apex.

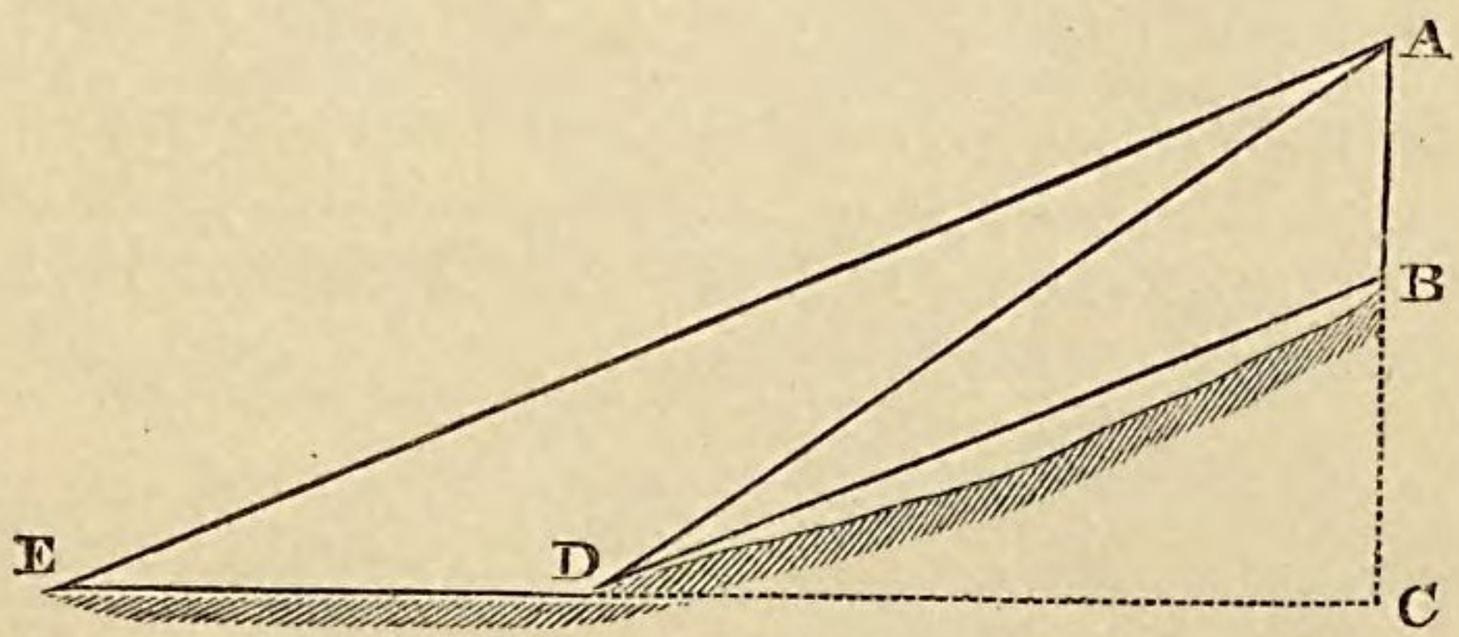


Fig. 59.

Required the height of A B and the difference of level between B and C, D being the nearest point to which you can get to B. Erect a stake the height of the eye at D, and measure the angles A E C and A D C as well as

the base E D : A C $= \frac{\text{E D}}{\text{cotan A E D} - \text{cotan A D C}}$: the height B C can be ascertained in the same way, which subtracted from A C gives A B. If A C is a height the foot of which is accessible, then A C = tan A E C × E C.

By the thermometer (Fahr.).—It can be used to ascertain the height of mountains thus : Let T = temperature of boiling water at any station deducted from 212, and H = height in feet of station above the sea. Boil some water and ascertain T by means of a thermometer : $H = 520\,T + T^2$.

Barometer.—With a pocket aneroid, the number of feet corresponding with the elevation above the sea is generally marked opposite the readings on the dial, so that to find the height of a mountain, observe the readings at its foot and at its summit, and subtract the former from the latter ; the difference is the height of the mountain approximately.

When the barometer is not marked with a scale of feet, the following is the formula : S : D : : 5500 : H, where S is the sum of, D the difference between the readings, and H the height required in feet. When the barometer usually stands between 28 and 30 in., the simplest and best formula is $\frac{d}{\cdot 0011}$ = height in feet, d being the recorded difference between the two places.

Thermometer.—To convert Centigrade or Reaumur into Fahrenheit, let C, R and F represent degrees in each respectively : $F = C \times 1 \cdot 8 + 32$; $= R \times 2 \cdot 25 + 32$: $C = (F - 32) \cdot 5555$; $R = (F - 32) \cdot 4444$.

NATURAL SINES AND TANGENTS.

Ang.	Sines.	Tang.	Ang.	Ang.	Sines.	Tang.	Ang.	Ang.	Sines.	Tang.	Ang.	Ang.	Sines.	Tang.	Ang.
5′	·0015	·0015		35′	·0102	·0102		37	·6018	·7536	53	64	·8988	2·0503	26
10′	·0029	·0029		40′	·0116	·0116		38	·6157	·7813	52	65	·9063	2·1445	25
15′	·0044	·0044		45′	·0131	·0131		39	·6293	·8098	51	66	·9135	2·2460	24
20′	·0058	·0058		50′	·0145	·0145		40	·6428	·8391	50	67	·9205	2·3559	23
25′	·0073	·0073		55′	·0160	·0160		41	·6561	·8693	49	68	·9272	2·4751	22
30′	·0087	·0087		60′	·0175	·0175		42	·6691	·9004	48	69	·9336	2·6051	21
								43	·6820	·9325	47	70	·9397	2·7475	20
Dg.			Dg.	Dg.			Dg.	44	·6947	·9657	46	71	·9455	2·9042	19
								45	·7071	1·0000	45	72	·9511	3·0777	18
1	·0175	·0175	89	19	·3256	·3443	44	46	·7193	1·0355	44	73	·9563	3·2709	17
2	·0349	·0349	88	20	·3420	·3640	43	47	·7313	1·0724	43	74	·9613	3·4874	16
3	·0523	·0523	87	21	·3584	·3839	42	48	·7431	1·1106	42	75	·9659	3·7321	15
4	·0698	·0699	86	22	·3746	·4040	41	49	·7547	1·1504	41	76	·9703	4·0108	14
5	·0872	·0875	85	23	·3907	·4245	40	50	·7660	1·1918	40	77	·9744	4·3315	13
6	·1045	·1051	84	24	·4067	·4452	39	51	·7771	1·2349	39	78	·9781	4·7046	12
7	·1219	·1228	83	25	·4226	·4663	65	52	·7880	1·2799	38	79	·9816	5·1445	11
8	·1392	·1405	82	26	·4384	·4877	64	53	·7986	1·3270	37	80	·9848	5·6713	10
9	·1564	·1584	81	27	·4540	·5095	63	54	·8090	1·3764	36	81	·9877	6·3138	9
10	·1736	·1763	80	28	·4695	·5317	62	55	·8192	1·4281	35	82	·9903	7·1154	8
11	·1908	·1944	79	29	·4848	·5543	61	56	·8290	1·4826	34	83	·9925	8·1443	7
12	·2079	·2126	78	30	·5000	·5774	60	57	·8387	1·5399	33	84	·9945	9·5144	6
13	·2250	·2309	77	31	·5150	·6009	59	58	·8480	1·6003	32	85	·9962	11·4301	5
14	·2419	·2493	76	32	·5299	·6249	58	59	·8572	1·6643	31	86	·9976	14·3007	4
15	·2588	·2679	75	33	·5446	·6494	57	60	·8660	1·7321	30	87	·9986	19·0811	3
16	·2756	·2867	74	34	·5592	·6745	56	61	·8746	1·8040	29	88	·9994	28·6363	2
17	·2924	·3057	73	35	·5736	·7002	55	62	·8829	1·8807	28	89	·9998	57·2900	1
18	·3090	·3249	72	36	·5878	·7265	54	63	·8910	1·9626	27	90	1·0000	infin.	0
Dg.	Co-sin.	Co tan.	Dg.	Dg.	Co-sin.	Co tan.	Dg.	Dg.	Co-sin.	Co-tan.	Dg.	Dg.	Co-sin.	Co-tan.	Dg.

ENGLISH and FRENCH WEIGHTS and MEASURES.

CAPACITY.

	Cub. Inches.	litres.	centilitres.
4 Gills=1 pint	= 34·75 =	0	56·75
2 Pints=1 quart	= 69·33 =	1	13·5
4 Quarts=1 gallon	= 277·25 =	4	54 =
10 lbs. of water.			
2 Gallons=1 peck	= 554·5 =	9	9
4 Pecks=1 bushel	=2218·19 =	36	34
8 Bshls=1 qr.=10·2 cub. ft.		=290	78
5 Qrs.=1 load=51·33 cub. ft.		=1493	90

Gals. × ·1605=cub. ft.: Cub. ft. × ·779 =bushels.

Bushels×1·284=cub. ft.: Cub. ft.×6·232 =gals.

Measures of capacity may not always be at hand: they can be made as follows:—

A box 24″×16″×22″ deep contains 1 barrel=10,752·00 cub. in.

A box 13″×13″×13⅛″ deep contains 1 bushel=2218·125 cub. in.

A box 7½″×7″×10 9/16″ deep contains 1 peck =554·5 cub. in.

AVOIRDUPOIS WEIGHT.

16 Drams =1 ounce =28·34 grammes.
16 Ounces =1 pound =·4535 kilgrms.
14 Lbs. =1 stone = 6·350302 „
2 Stone =1 quarter =12·700604 „
4 Quarters=1 cwt. =50·802416 „
20 Cwt. =1 ton =1016·04832 „
2000 Lbs. =1 ton in Canada and the U.S.
Lbs.×·009 =cwt.: Lbs.×·00045=tons.
Cub. inches×·003607=gals.
Cub. inches×·00045=bushels.

LENGTH AND SQUARE MEASURE.

1 inch = ·0254 mètres.
12 Inches =1 foot = ·30479 „
3 Feet =1 yard = ·9144 „
5½ Yards=1 rod = 5·0292 „
22 „ =1 chain = 20·1168 „
40 Rods =1 furlong =201·168 „
8 Furlongs, 80 Chains, 1760 Yards } 1 mile* = { 1609·31, 1·60931 kilomètres.

69·0197 Miles=1 degree: Miles×87=knots
6 Feet=1 fathom: Knots×1·15=miles.
120 Fathoms=1 cable length.
Feet × ·00019=miles: Yards × ·00057 = miles.
640 Acres=1 sq. mile: 4840 sq. Yards.= 1 acre.
For rough calculations, 70 yds.×70 yds.= 1 acre.
Sq. Feet×·111 = sq. yds.: sq. Inches × ·007=sq. yds.
Cub. Feet×·03704 (or for an approximate calculation ·04)=cub. yds.: Cub. Inches ×·00058=cub. feet.
40 Rods=1 rood: 4 Roods=1 acre.
4 Inches=1 hand (for height of horses).
500 Bricks= 1 load.
32 Bushels of lime= Do.
36 „ sand= Do.
36 Trusses of straw or hay=Do.
1 Chaldron of coal=53 cwt.
1 Sack of potatoes=224 lbs.

FRENCH.

LENGTH.

	Yards.	Ft.	Inches.		Yards.
Centimètre =	0	0	·39371	or×	·010936=
METRE =	1	0	3·371	or×	1·0936=
Hectomètre=	109	1	1	or×	109·363=
Kilomètre=	1093	1	10·2	or×	1093·63=

Lieue de poste (2000 toises)=4263 yards or 2·4222 miles.
Kilomtr×·621383=miles: Miles×1·60932 =Kilomètres. Roughly, the proportion between miles and kilomètres is as 5 is to 8.

WEIGHT.

1 GRAMME=·0022 lbs.
1 Kilogramme=2·2048 lbs.=·01969 cwt.
Lbs. × ·4535 = kilogramme: Tonnes × 1·015965=tons.
Tons×·984=tonnes.

SOLIDS.

Millistere=61·028 cub. in.
STERE=35·317 cub. ft.=1 cub. mètre.
Hectostere=130·8 cub. yds.
Cub. Ft.×·0283153=cub. mètres.

CAPACITY.

Centilitre=·0022 gals. or ·6103 cub. inchs.
LITRE =·22 „ or 61·028 „
Hectolitre=22·0 „ or 2·75 Impl.bshls.
Kilolitre =220 „ or 35·317 cub. ft.
Gallons × 4·543=litres: Cub. In. × ·0163 =litres.

SQUARE MEASURE.

Milliare=115 sq. in.
Centiare=10·764 sq. ft.
Deciare=11·96 sq. yds.
ARE= 119·6 „
Decare=1196·046 „
Hectare=2·4712 acres=11,960·46 sq. yds.
Sq. Mètres×10·7643=sq. ft.
Sq. ft.×·0928997=sq. mètres.

N.B.—In the French system Deca means 10 times: Deci, $\frac{1}{10}$th of; Hecto, 100 times and Centi $\frac{1}{100}$th of: Kilo, 1000 times and Mille $\frac{1}{1000}$th of.

* In the province of Quebec the country people reckon distances by Arpents and Leagues; the former is about 63 yards (28 arpents=1 mile); 84 arpents=1 league.

TABLE

OF

FOREIGN WEIGHTS, MEASURES, &c.

Table of Foreign Weights, Measures and Coinage most

COUNTRY.	WEIGHTS.		MEASURES.		LAND MEASURES.	
	Name of Weight.	English Weight avoirdupois, lbs.	Name of Measures.	English Feet.	Measures.	English Acres.
Austria . .	Pfund = 32 loths . .	1·2347 .	Fuss . . .	1·0371 .	Joch . . .	1·4233 .
Arabia . . .	Maund . . . / Bahar . . .	3 / 450 .	Guz. . . .	0·6944 .	. . . . .	. . .
Belgium . .	. . . See France . . .		Foot . . .	0·937 .	Same as France.	
Bavaria . .	Pfund = 32 loths . .	1·2347 .	Fuss . . .	0·953 .	. . . . .	. . .
Bengal. . .	Maund (40 seers) / Seer	82·133 / 2·0533	Guz. . . .	3·0 . .	. . . . .	. . .
Bombay . .	Maund (40 seers) / Seer . . . . / Candy . . .	28 / 0·7 / 560 .	Guz. . . .	·75 . .	. . . . .	. . .
Bohemia . .	. . . See Austria . . .		. . . . .	. . .	. . . . .	. . .
Canada. . .	Cwt.	100 . .	. . . . .	Same as in England . .		. . .
Cape of Good Hope. .	. . .See England . . .		. . . . .	"	"	. . .
China . . .	Pecul = 100 catties .	133·3333	Chang = 10 chih .	11·75 .	. . . . .	. . .
Denmark . .	Pund	1·1028 .	Fod . . .	1·02973	Morgen . .	0·630945
Egypt . . .	1 Cantar = 40 okes .	100·8 .	Gasab . . .	0·944 .	Fedden al risach	0·6628 .
France . . .	Kilogramme .	2·2048 .	Metre . . .	3·2808 .	Hectare . .	2·4712 .
Greece . . .	Libbra . . .	1·06. .	Foot . . .	·98416 .	. . . . .	. . .
Germany . .	Metric lb. . .	1·1024 .	Rhenish foot .	1·02973	. . . . .	. . .
Hamburg . .	Pfund. . . .	1·0682 .	Ell=2 fuss. .	1·8794 .	Morgen . .	0·630945
Hanover . .	Centenar = 100 pfunds .	103·1236	Foot . . . / Ell. . . .	0·954 / 1·91667	Do	0·6438 .
Hesse . . .	Pfund. . . .	1·07 .	Fuss . . .	0·9 . .	Acker . . .	0·5897 .
Holland . .	Pond	2·2047 .	Foot . . . / Ell	0·928 / 3·280916	Bunder . .	2·471169
Italy . . .	Kilogramme. .	2·2048 .	Metra . . .	3·280916	Giornata . .	0·9393 .
Japan . . .	Pecul = 100 catties .	133·3333	Inc	6·25 .	. . . . .	. . .
Malta . . .	Rottolo . . .	1·7503 .	Foot . . .	0·93 .	Salma . . .	4·44 .
Madras. . .	Seer	0·625 .	Yard . . .	3·0833 .	. . . . .	. . .
Milan . . .	Libbra Mettrica . .	2·2047 .	Metra . . .	3·280916	Tornatura. .	40·4682
Naples . . .	Rotolo. . . .	1·9642 .	Canna . . .	6·93167	Moggio. . .	0 8261
Netherlands .	. . . . .	. . .	. . . . .	. . Vide	Holland . .	. . .
Persia . . .	Cherray . . .	0·7885 .	Arish . . . / Guerze . .	12·7566 / 2·083	. . . . .	. . .
Portugal . .	Arratel . . .	1·0118 .	Vara . . .	3·5958 .	Geira . . .	1·4818 .
Poland . .	See Russia.	. . .	. . . . .	. . .	. . . . .	. . .
Prussia. . .	Centenar = 110 Pfunds .	113·436	Fuss . . .	1·02973	Morgen . .	0·630945
Rome . . .	Libbra . . .	0·7477 .	Canna . . .	6·5307 .	Pezza . . .	0·6524 .
Russia . . .	Pood = 40 pounds .	36·11408	Foot . . . / Sachine . .	1·146 / 7·0	Desatine . .	2·45 .
Saxony. . .	Pfund=32 loths.	1·0309 .	Ell	1·8582 .	. . . . .	. . .
Sicily . . .	Libbra . . .	0·7 . .	Canna . . .	6·3725 .	. . . . .	. . .
Spain . . .	Libbra Castiliana .	1·0144 .	Foot . . . / Warra=3 pies	0·927 / 2·782	Fanegada . .	1·1364 .
Sweden. . .	Skalpünd. . .	0·93653	Fot	0·974107	Tunland . .	1·21988
Switzerland .	Killogramme .	22048 .	Mètre . . .	3·28[illegible]8 .	Hectare . .	2·471169
United States of America	Cwt. . . . / Ton	100 / 2000 .	Foot . . .	1 . .	Acre . . .	1 . .
Turkey. . .	Rottolo . . .	1·27 .	Pike . . .	2·218 .	. . . . .	. . .

commonly in use, with their equivalents in English Measures, &c.

ROAD MEASURES.		LIQUID MEASURES.			COMMON COINAGE.		
Measures.	English Yards.	Measures.	Imperial Gallons.	Number to 100 Imperial Gallons.	Name of Coin.	Metal.	Value in s. d.
Mile . . .	8239·034	Eimer . . .	0·2201 .	454·3889	Gulden or Florin. .	Silver	2 0
Mile . . .	2148 .	Noosfia . . . / Gudda (8 noosfia)	0·25 . / 2 . .	400 / 50 .	Piastre . / 80 coveers	Silver	3 8·5
. . Same as	France .	. . . . .	. . .	. . .	Franc . . .	Silver	0 9·38
Meile. . .	8059 .	Eimer . . .	14·116 .	7·0841 .	Gulden=60 kreutzen .	Silver	1 7·9
Koss . . .	2000 .	. . Liquids are sold by Weight . .			Rupee. . .	,,	1 10·29
. . . . .	. . .	Do.	Do. . .	Do. . .	Do. . . .	,,	Do.
Mile . . .	8297 .	. . . . .	. . .	. . .	Thaller . .	,,	4 0·8
. . . . .	. . .	. . . . . See England .		. . .	Dollar . .	Silver	4 1·25
. . . . .	. . .	. . . . . ,,	,, . .	. . .	Rix dollar= 8 skillings	,,	1 6
Li . . .	609 . .	Shing . . .	1·025 . (liquid	sold by Weight	Tael . . .	,,	6 8·625
Mile . . .	8237·834	Potte. . . .	0 2339 .	470·32 .	Rixdaler . .	,,	2 2·35
. . . . .	. . .	. . . . .	. . .	. . .	Piastre . .	,,	0 2·47
Lieue . .	4374·552	Litre	·22 .	454·545	Franc. . .	Silver	0 9·38
Mile . . .	1640 .	Keramion . .	8·488 .	11·7836	Drachm . .	,,	0 8·4
Long mile. / Short do. .	10126 / 6859	. . . . .	. . .	. . .	Thaler=30 groschen	,,	2 10·75
Mile . . .	8237·834	Viertel . . .	1·593585	62·7515	Rixdollar. .	,,	3 7
Mile . . .	84·66 .	Stübchen . .	0·85705	116·9609	Thaler . .	,,	2 10·75
Mile . . .	10547 .	Mass . . . / Viertel . . .	0·44 / 1·76	. . .	Do. . . .	,,	2 10·75
Myle. . .	1093·638	Kan	0·2201 .	454·3889	Florin . .	,,	. .
Do. . . .	1093 .	Boccale . . .	0·1722 .	. . .	Lira-nuova .	Silver	0 9·38
. . . Same	as China	. . . . .	. . .	. . .	Itsiboo . .	,,	1 5·25
. . . . .	. . .	Caffiso . . .	4·58 .	. . .	Scudo . . .	,,	1 8
. . . . .	. . .	. . . . .	. . .	. . .	Rupee. . .	,,	1 10·29
. . . . .	. . .	Pinte . . .	0·2201 .	454·3889	Lira-nuova .	,,	0 9·38
Millia . .	2024·236	. . . . .	. . .	. . .	Ducat . . .	,,	3 3·75
. . . . .	. . .	. . . . .	. . .	. . .	Gulden . .	,,	1 8
Parasang .	6086 .	. . . . .	. . .	. . .	Rupee. . .	,,	1 6 (about)
Legua . .	6763 .	Cantaro . . .	3·6405 .	27·47 .	Milreis . .	,,	4 8·66
Long mile. / Short do .	8101 / 6075	. . . . .	. . .	. . .	Florin . .	,,	0 5·62
Mile . . .	237·8347	Quart . . .	0·252021	396·791	Thaler . .	,,	2 10·75
Miglia . .	1628 .	Boccale . . .	0·4012 .	. . .	Scudo . . .	,,	4 2·5
Verst. . .	1167 .	Vedra . . .	2·7049 .	36·27 .	Ruble . . .	,,	3 1·53
Mile . . .	7432 .	Kann . . .	0·2059 .	485·6726	Thaler . .	,,	2 10·75
. . . . .	. . .	Salma . . .	19·226 .	. . .	Scudo . . .	,,	4 1·4
League . .	4565·461	Aroba major .	3·55 .	28·169 .	Piastre=13 reals	,,	4 2·25
Mil . . .	11689 .	Kannor . . .	0·576043	173 598	Rixdaler . .	,,	4 4·5
Lieue . .	4374·552	Setier . . .	10·06 .	9·94 .	Franc . . .	,,	0 9·38
Mile . . .	1760 .	Gallon . . .	0·83311	. . .	Dollar. . .	Silver	4 1·25
Berri. . .	1826 .	Almud . . .	1·152 .	86·96 .	Piastre . .	,,	0 2·25

FOREIGN MONEY WITH ITS VALUE IN BRITISH.

Austria and Bohemia.

GOLD.	£	s.	d.
Ducat	0	9	4·75
Souverain d'Or	1	7	10·5
SILVER.			
Thaler or 2 gulden . . .	0	4	0·8
Gulden	0	2	0·4

60 Kreutzer=1 gulden.
4 Pfennig=1 kreutzer.

Bavaria.

SILVER.			
Gulden=60 kreutzen . .	0	1	7·9

1 Kreutzer=4 pfennigen.

Belgium.

SILVER.

Same as France.

Brazils.

GOLD.			
1 Moeda=10,000 reis . .	1	5	11
SILVER.			
1 Pataca or dollar=1,200 reis	0	4	2·25
1 Milreis=1,000 reis . .	0	3	$5\frac{7}{8}$

China.

1 Tael=10 mace	0	6	8·625
1 Mace=10 candereen . .	0	0	8·062
1 Candereen=10 cash . .	0	0	0·806

Denmark.

SILVER.			
Rigsbank thaler=96 skilling	0	2	2·35

East Indies.

GOLD (MADRAS).			
1 Gold mohur=15 rupees .	1	9	$2\frac{7}{10}$
Do. in Bengal=16 do. .	1	11	1
1 Rupee=16 annas . . .	0	1	10·29
COPPER.			
1 Anna=12 pie	0	0	1·394

1 Lakh=100,000 rupees.
1 Crore=10,000,000 rupees.

A rupee is generally reckoned as 2 shillings; so by cutting off the last figure from any sum you convert it into pounds: thus 1,000 rupees is commonly called £100.

Egypt.

	£	s.	d.
1 Piastre=40 paras . . .	0	0	2·47

Or £1=97 piastres 20 paras.

France.

GOLD.			
1 Napoleon=20 francs . .	0	15	10·32
10 Franc piece.	0	7	11·16
SILVER.			
5 Franc piece	0	3	11·58
2 do. do.	0	1	6·76
1 do. do. (legal standard)	0	0	9·3

1 do. do.=100 centimes.

Gibraltar.

1 Dollar=12 reals. . . .	0	4	2
1 Real=16 quartos . . .	0	0	4·16

Greece.

GOLD.			
20 Drachmai piece . . .	0	14	2·2
SILVER.			
5 Drachmai piece	0	3	6
1 do. do. =100 septa	0	0	8·4

Hamburg.

1 Rix-dollar=3 marks . .	0	3	7
1 Mark=16 schillings . .	0	1	2·33
1 Mark banco	0	1	5·5

Hanover.

1 Thaler=24 groschen . .	0	2	10·75

1 Groschen=pfennigen.

Italy.

The legal unit is now the lira nuova=100 centisimi . .	0	0	9·38

The pieces are as in France.

Malta.

	£	s.	d.
1 Pezza=30 tari	0	4	2
1 Scudo=12 tari	0	1	8
1 Taro =12 grani	0	0	1·67

Mexico.

1 Duro=8 reals	0	4	2
1 Real =12 dineros	0	0	6·25
1 do. =100 cent.			

Netherlands.

SILVER.

Gulden	0	1	8
1 do.=100 cents.			

Poland.

1 Florin=30 groschen	0	0	5·62

Portugal.

GOLD.

Crown=5000 reis	1	3	11·25
Crusado=400 reis	0	1	11

SILVER.

1 Milreis=1000 reis	0	4	8·66

Prussia and Zollverein.

1 Thaler=30 groschen	0	2	10·75
1 Groschen=10 pfennigen	0	0	1·16

Rome.

Scudo=10 paoli=100 bajochi	0	4	2·5

Russia.

GOLD.

Imperial=10 rubles	1	10	11

SILVER.

Ruble=100 kopeks	0	3	1·53

Spain.

GOLD.

Onze d'Oro or Doblon	3	4	8
Ochenta	0	16	10
Escudo	0	8	5
Durillo	0	4	2·5

SILVER.

Duro=20 reals	0	4	2·5
Real=maravedis	0	0	2·5

Sweden.

1 Daler banco=48 skillingar	0	1	7·93
1 Species daler	0	4	5·06
1 Biksgäld daler	0	1	1·28

Switzerland.

Same as France.

Turkey.

1 Piastre=40 paras	0	0	2·25

United States of America.

GOLD.

Eagle	2	0	10·8

SILVER.

Dollar=100 cents	0	4	1·25

Japan.

GOLD.

Cobang	1	5	11

SILVER.

Itsiboo	0	1	5·25

Canada.

GOLD.

Pound	0	16	5·5

SILVER.

Shilling	0	0	9·75
Dollar	0	4	1·25

COPPER.

Penny	0	0	0·75

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